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REPORT 96-1156
Part III

NUCLEAR WASTE RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACT OF 1980

SEPTEMBER 3, 1980.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

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Mr. STAGGERS, from the Committee on Interstate and Foreign Commerce, submitted the following

COMPLETED ORIGINAL

REPORT

together with

ADDITIONAL, SEPARATE AND SUPPLEMENTAL VIEWS

[To accompany H.R. 7418]

[Including cost estimate of the Congressional Budget Office]

The Committee on Interstate and Foreign Commerce, to whom was referred the bill (H.R. 7418) to establish a research, development, and demonstration program for the disposal of radioactive wastes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

The amendment is as follows:

Strike out all after the enacting clause and insert in lieu thereof the following:

SHORT TITLE

SECTION 1. This Act may be cited as the "Nuclear Waste Research, Development, and Demonstration Act of 1980".

FINDINGS AND PURPOSES

SEC. 2. (a) The Congress finds that—

(1) the efforts made in the last thirty years to devise a permanent solution to the problems of high level radioactive waste disposal have not been adequate;

(2) only the Federal Government has the capability to provide for the permanent disposal of high level radioactive waste which has been produced from military and commercial activities;

(3) the accumulation of such waste from military and commercial activities and from activities related to medical research, diagnosis, and treatment, as well as such waste from other activities, including research and development activities, is a national problem;

(4) although recent scientific studies and a majority of scientists assert that high level radioactive waste generated through the use of nuclear technologies can be disposed of safely with no significant impact upon the public health and environment, no method for the permanent disposal of such waste has ever been demonstrated;

(5) research, development, and demonstration is a desired prerequisite to confirming the existence of a safe and reliable process for the permanent disposal of high level radioactive waste;

(6) the development of a safe and timely solution to the problem of the permanent disposal of high level radioactive waste is essential if nuclear power is to make a significant contribution to meeting the future energy requirements of the United States; and

(7) the demonstration of a safe and reliable process for the permanent disposal of high level radioactive waste will aid the Nuclear Regulatory Commission in establishing regulations governing the design, construction, and operation of repositories.

(b) The purposes of this Act are—

(1) to establish a directed and orderly research, development, and demonstration program in the Department of Energy for the permanent disposal of high level radioactive waste;

(2) to seek to confirm the existence of technological solutions for safely disposing of high level radioactive waste; and

(3) to develop the experience, data, and information necessary for the Secretary of Energy to build and operate full-scale high level radioactive waste repositories.

ESTABLISHMENT OF PROGRAM

SEC. 3. (a) The Secretary of Energy shall, not later than sixty days after the date of the enactment of this Act, establish a research, development, and demonstration program for the disposal of high level radioactive waste, which program shall include integrated technology demonstrations and which shall be implemented in accordance with this section.

(b)(1) Under the program, the Secretary shall identify four potential sites for high level radioactive waste repositories in the continental United States. Two potential sites shall be identified not later than the fourth quarter of fiscal year 1981, and two additional potential sites shall be identified by the end of fiscal year 1983.

(2) The potential sites for repositories shall be located (A) in different geologic media, such as basalt, salt, salt domes, or granite, and (B) to the extent practicable, in different regions of the United States.

(3)(A) The Secretary shall undertake such site characterization activities as are necessary to provide data and information in order to determine the suitability of the sites for further development into demonstration repositories under the program.

(B) The Secretary shall conduct at the potential sites such tests as may be necessary to provide the necessary data for compliance with the National Environmental Policy Act of 1969. The Secretary shall report to the Commission on the tests conducted at a site pursuant to this subparagraph and on the information developed from such tests.

(4) The Secretary shall, as soon as practicable, make the final selection of sites for demonstration repositories under the program. The selection shall be made by such date as may be necessary to enable the Secretary to meet the time deadlines prescribed by subsection (c)(1).

(c)(1) The Secretary shall design, construct, and operate at each of the sites selected under subsection (b)(4) a demonstration repository for high level radioactive waste. The first demonstration repository shall be in operation by the end of fiscal year 1986, the second demonstration repository shall be in operation by the end of fiscal year 1987, and the third and fourth demonstration repositories shall be in operation as prescribed by legislation enacted after the date of the enactment of this Act.

(2) Demonstration repositories—

(A) shall be no larger than is appropriate to conduct the necessary research and development activities to demonstrate the safe disposal of high level radioactive waste, taking into consideration the necessary handling, engineering, space, configurations, and heat dissipation of such waste;

(B) shall be designed with a capacity for receiving a maximum of forty metric tons of waste; and

(C) may be mined at depths, and shall be constructed with methods, similar to those which would be used in the construction of full-scale repositories.

(3) No waste may be placed in a demonstration repository under the program unless—

(A) the waste is high level radioactive waste which is owned by the Federal Government and is the result of unlicensed activities;

(B) the waste may be retrieved; and

(C) a place certain which is physically capable of receiving the waste, as determined by the Secretary, has been identified for receiving the waste after the termination of the program.

(4) None of the activities under the program preceding the excavation of shafts for demonstration repositories shall be considered to be a major Federal action for purposes of section 102(2)(C) of the National Environmental Policy Act of 1969.

(5) The operation of any demonstration repository may not extend beyond the year 2000.

(d) Under the program, the Secretary may place in demonstration repositories canisters of solidified high level radioactive waste which canisters are contained in engineered barriers, including overpack canisters. The Secretary shall consult with the Commission with respect to the development of such barriers.

(e) Within one year from the date of the enactment of this Act, the Secretary shall enter into an agreement with the Commission to establish arrangements for review and consultation by the Commission with respect to the program. The agreement shall provide for the following:

(1) The Secretary shall submit to the Commission, for its review and comment—

(A) a plan describing how site characterization activities carried out under the program will not disturb the integrity of the geological structure of the site where the activities are carried out, and

(B) a plan describing the form and manner in which high level radioactive waste will be placed in the demonstration repositories under the program.

In preparing its comments on any plan, the Commission shall specify with precision its objections to any provision of the plan. Upon submission of a plan to the Commission, the Secretary shall publish a notice in the Federal Register of the submission of the plan and of its availability for public inspection, and, upon receipt of the comments of the Commission respecting a plan, the Secretary shall publish a notice in the Federal Register of the receipt of the comments and of the availability of the comments for public inspection. If the Secretary does not revise a plan to meet objections specified in the comments of the Commission, the Secretary shall publish in the Federal Register a detailed statement for not so revising the plan.

(2) The Secretary shall submit to the Commission safety analysis reports and such other information as the Commission may require to identify any danger to the public health and safety which may be presented by the program.

(3) The Secretary shall not undertake any excavation of a site for a demonstration repository before receiving the concurrence of the Commission for such excavation.

(4) During the program, the Secretary shall afford the Commission access to the demonstration repositories to enable the Commission to monitor the repositories for the purpose of assuring the public health and safety.

(f)(1) The Secretary shall, on a continuing basis, consult and coordinate with the officials of each State in which the Secretary proposes to construct a demonstration repository respecting his plans for, and his construction of, any such repository. The Secretary shall notify the Governor of the State of his intention to locate a demonstration repository within the State and, if there is no law of such State providing for the designation of an official to coordinate activities for the State with respect to repositories of radioactive waste, the Governor shall designate a State official to coordinate activities for the State with respect to any repository to be constructed under the program in such State.

(2)(A) Before identifying under section 3(b)(1) a site for a repository for high level radioactive waste, the Secretary shall hold public hearings in the vicinity of the site for the purpose of informing the residents of the area in which the site is located of the activities proposed to be undertaken at the site and to receive their comments.

(B) Before making a final selection of a site under section 3(b)(4), the Secretary shall hold public hearings in the vicinity of the site for the purpose of informing the residents of the area in which the site is located of the selection of the site and to receive their comments.

(g) All demonstration facilities authorized by this section shall be constructed and operated as research, development, and demonstration facilities pursuant to section 202 of the Energy Reorganization Act of 1974. Such facilities shall be constructed and operated in accordance with all other applicable law.

(h)(1) If the Commission determines that any activity of the Secretary under the program or the failure of the Secretary to take specified actions presents a danger to the public health and safety, the Commission shall issue an order directing the Secretary to cease such activity or to take such actions, and if the Commission determines that any activity proposed to be undertaken by the Secretary under the program may present a danger to the public health and safety, the Commission shall issue an order directing the Secretary to not undertake such activity.

(2) If the Commission issues an order under paragraph (1), it shall publish the order in the Federal Register, give notice of a public hearing on the order, and, as soon as practicable, hold such hearing. Upon completion of the hearing, the Commission shall affirm, revise, or rescind, as appropriate, the order with respect to which the hearing was held.

(3) The Secretary may not conduct any activity which is prohibited by an order of the Commission in effect under this subsection and shall take such actions as may be required by an order in effect under this subsection.

(i) There is authorized to be appropriated to the Secretary to carry out this section—

(1) $102,000,000 for the fiscal year ending September 30, 1981, and

(2) for subsequent fiscal years, such sums as may be authorized by legislation enacted after the date of the enactment of this Act.

(j) The authority of the Secretary to enter into contracts under this section shall be effective for any fiscal year only to such extent or in such amounts as are provided in advance by appropriation Acts.

(k) The Secretary, in consultation with the Commission, shall make an annual report to the Congress on the program. Each report shall include—

(1) a description of the activities undertaken and the costs incurred in the program in the period reported on,

(2) the activities proposed to be undertaken and the costs proposed to be incurred in the program in the succeeding period,

(3) a description of any problems encountered in the implementation of the program,

(4) a description of the hearings held pursuant to subsection (f)(2),

(5) such separate views and recommendations as the Commission may include in the report, and

(6) such other information as the Secretary determines appropriate.

LOW-LEVEL RADIOACTIVE WASTE STUDY

SEC. 4. (a) The Secretary shall—

(1) conduct a study of the advantages and disadvantages of (A) using a glass furnace, or other appropriate device, to consume and reduce the volume of low level radioactive waste while at the same time appropriately containing such waste; (B) locating any such device at nuclear powerplants to serve as processing facilities of low level radioactive waste generated in the regions in which the plants are located before the shipment of the waste for permanent disposal; (C) using existing underground caverns produced by nuclear explosive detonations for the permanent disposal of low level radioactive waste; and (D) allowing short-lived, low level radioactive waste to be held in storage until safe for permanent disposal as nonradioactive wastes; and

(2) submit a report by June 1, 1981, containing the findings, conclusions, and recommendations resulting from the study required by paragraph (1) to the Speaker of the House of Representatives and the President pro tempore of the Senate.

(b) There is authorized to be appropriated to carry out subsection (a) $2,000,000.

(c) The authority of the Secretary to enter into contracts under this section shall be effective for any fiscal year only to such extent or in such amounts as are provided in advance by appropriation Acts.

DEFINITIONS

SEC. 5. (a) For purposes of this Act:

(1) The term "Secretary" means the Secretary of Energy.

(2) The term "Commission" means the Nuclear Regulatory Commission.

(3) The term "program" means the program authorized by section 3.

(4) The term "site characterization" means exploration and study, both in the laboratory and in the field, undertaken to establish the geologic conditions of a particular site. Site characterization includes borings, surface excavations, excavations of exploratory shafts, and in situ testing needed to determine the suitability of a site for a geologic repository, but does not include preliminary borings and geophysical testing needed to decide whether site characterization should be undertaken.

(b) For purposes of the program only:

(1) The term "high level radioactive waste" means spent nuclear fuel and the highly radioactive wastes resulting from the reprocessing of spent nuclear fuel. Such term includes both liquid wastes which are produced directly in reprocessing, dry solid material derived from such liquid waste, and such other material as the Commission designates as high level waste for purposes of protecting the public health and safety.

(2) The term "transuranic waste" means material contaminated with elements which have an atomic number greater than 92, including neptunium, plutonium, americium, and curium, which have a half life greater than 5 years, and which are in concentrations greater than 10 nanocuries per gram or in such other concentrations as the Commission may prescribe to protect the public health and safety.

(3) The term "low level radioactive waste" means radioactive waste not classified as high level radioactive waste, transuranic waste, or byproduct material as defined in section 11e. (2) of the Atomic Energy Act of 1954.

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PURPOSE OF THE BILL

The purpose of the bill is to establish a demonstration program for the disposal of high level radioactive waste by the Department of Energy and to provide for the conduct of a study on methods for the disposal and consolidation of low level waste and to authorize to be appropriated to the Department of Energy the sum of $104,000,000 for Fiscal Year 1981.

LEGISLATIVE BACKGROUND

On May 21, 1980, the Honorable Mike McCormack (for himself, Mr. Goldwater, Mr. Fuqua and Mr. Wydler) introduced H.R. 7418, which was referred to the Committee on Science and Technology. On June 4, 1980, the Honorable Harley O. Staggers, Chairman of the Interstate and Foreign Commerce Committee, requested the

bill be sequentially referred to the Interstate and Foreign Commerce Committee.

On July 2, 1980, the Committee on Science and Technology reported the bill with amendments.

Committee Action

On July 2, 1980, the bill, H.R. 7418, as reported by the Science and Technology Committee, was sequentially referred to the Interstate and Foreign Commerce Committee. On July 25 and 28, 1980, the Subcommittee on Energy and Power conducted hearings on the bill and related legislation. On August 19, 1980, the Subcommittee considered the bill and ordered it reported to the Committee, as amended, by voice vote. On August 26, 1980, the Interstate and Foreign Commerce Committee met in open session and considered the bill. Then, a quorum being present, the Committee by voice vote, ordered the bill reported with an amendment.

The Committee hearings on this legislation are discussed Infra, at the section entitled "Committee Hearings."

Summary of H.R. 7418

As reported by the Committee, H.R. 7418 authorizes a total of $104,000,000 to the Department of Energy for Fiscal Year 1981, to establish a demonstration program for the disposal of high-level radioactive waste and to conduct the study on improved methods for disposing of low-level radioactive waste. The bill establishes within the Department of Energy a program for the purpose of demonstrating methods for disposing of high-level radioactive waste. The Secretary is directed to identify four potential sites for the location of demonstration repositories which are to be located in a different geologic media and, to the extent practicable, in different regions of the country. The Secretary is to identify two sites by the end of the fourth quarter of 1981 and two additional sites by the end of 1983. After having conducted the necessary site characterization activities, the Secretary is to select final sites for the location of demonstration repositories. After making the final selection, the Secretary is directed to design, construct and operate at each such suitable site a demonstration repository, with the first being operational by 1986, the second in 1987, and the third and fourth by such time as may be prescribed in subsequent legislation.

Consistent with the demonstration orientation of the program, each such repository is to be limited in size to be no larger than necessary to conduct the appropriate demonstration activities and each is specifically limited to having a capacity no larger than capable of receiving 40 metric tons of high-level radioactive waste. Each such repository may be mined at depths and constructed with methods similar to those which would be used in the construction of a full-scale repository. Under the provisions of the bill, any waste placed in such demonstration repositories must be owned by the Federal Government and result from unlicensed activities. As these repositories are merely for demonstration purposes, all waste placed in such repositories must be retrievable. As the demonstration program must at some point terminate, the bill requires that before emplacing any waste in the repository, the Secretary must

identify an existing facility which is physically capable of receiving the waste at the conclusion of the program. The bill directs the Secretary to conduct at the proposed sites such tests as may be necessary to provide the data needed for compliance with the National Environmental Policy Act of 1969. However, the bill provides that none of the activities under the program preceding the excavation for shafts during site characterization activities or construction for demonstration repositories are to be considered a major federal action pursuant to section 102(2)(C) of the National Environmental Policy Act of 1969.

The bill specifically requires that any demonstration repository may not continue to operate beyond the year 2000.

The Secretary is authorized to emplace in any demonstration repository canisters of high level radioactive waste which are designed in such a manner that the canisters themselves are to serve as engineered barriers to the release of the radioactive nuclei, including overpacked canisters. The bill provides, however, that any such engineered barriers comply with the such requirements as may be specified by the Nuclear Regulatory Commission.

The bill directs the Secretary of Energy to enter into an agreement with the Nuclear Regulatory Commission to establish arrangements for review and comment by the Commission with respect to all aspects of the high-level radioactive waste demonstration program. The terms of the agreement are to specifically include the requirement that the Secretary submit to the Commission, for its review and comment, a plan which will describe how the Department will undertake site characterization activities in a manner that will not disturb the geologic integrity of the site. The Secretary is also directed to submit a plan to the Commission which describes the form and manner in which the high-level radioactive waste will be placed in such demonstration repositories. The Secretary is further directed to publish in the Federal Register a notice that the plan has been submitted and that the plan is available for public inspection. The Commission is then directed to specify with precision any objections to any provisions of the plan, and the Secretary is then directed to publish a notice in the Federal Register that the Commission has responded and that such response is available for public inspection.

In the event that the Secretary does not modify the plan to meet the objections specified in the comments of the Commission, the Secretary shall publish in the Federal Register a detailed statement containing the reasons why any portion of the plan has not been revised. Under the agreement, the Secretary is directed to submit to the Commission safety analysis reports and any other information the Commission may require to insure that the Commission has the opportunity to identify any danger to the public health and safety which may be presented by the initiation of the program. If the Commission determines that any activity of the Secretary under the program presents a danger to public health or safety, it shall issue an order stopping or correcting the activity.

The Secretary is to include in the agreement a provision which requires that before the Secretary undertakes any excavation of a site for a demonstration repository as either part of site characterization activities or construction, he must receive the concurrence of the Commission for any such excavation. Finally, the agreement

is to insure that the Secretary afford the Commission access to the demonstration repositories to enable the Commission the opportunity to monitor the repositories for the purpose of assuring that the public health and safety are fully protected.

The bill requires that the Secretary, on a continuing basis, consult and coordinate with the appropriate officials of each state in which the Secretary proposes to construct a demonstration repository. Such consultation and coordination is to include making available the Secretary's plans for the construction of any such repository. The Secretary is directed to notify the Governor of the state of his intention to locate demonstration repository within the state, and if there is no law providing for the designation of an official to coordinate activities for the state with respect to the repository, the Governor is directed to designate a state official for the purposes of such coordination.

Before identifying any site as a potential repository, the Secretary is directed to hold public hearings in the vicinity of the site for the purpose of informing the residents in the area in which the site is located of the activities proposed to be undertaken at the site and to receive their comments. Additionally, before actually selecting a site for the construction of a demonstration repository, the Secretary is directed to hold public hearings in the vicinity of the site for the purpose of informing the residents of the impending selection and receiving their comments.

The Nuclear Regulatory Commission is given the authority to issue an order directing the Secretary to cease any acitivity or to take corrective action whenever the Commission determines that such activity presents a danger to the public health and safety. Upon publication of notice of a public hearing in the Federal Register and completion of the hearing, the Commission may affirm, revise or rescind the order. The Secretary may not conduct any activity which is prohibited by an order of the Commission.

The bill also requires that any demonstration repository constructed and operated as a research, development and demonstration facility shall be done pursuant to the requirements of section 202 of the Energy Reorganization Act of 1974. Such facilities shall be constructed and operated in accordance with all other applicable laws. The bill also requires that the Secretary, in consultation with the Commission, make annual reports to the Congress on the program. Such reports are to include a description of the activities undertaken and the cost incurred in the program in the period reported on together with a description of the activities proposed to be undertaken and the costs to be incurred in the succeeding periods. Additionally, the report is to include a description of any problems encountered in the implementation of the program and a description of the hearings held in the area of the site, together with separate views and recommendations that the Commission may have regarding any aspect of the report.

The Secretary is also directed to initiate a study on the advantages and disadvantages of using a glass furnace or other appropriate device to consume and reduce the volume of low level radioactive waste and of locating any such device at the site of a nuclear power plant to serve as a processing facility for low level radioactive waste generated in the region in which the plants are located before shipment for such waste for final disposal. The study is also

to include consideration of using existing underground caverns produced by nuclear explosive detonations for disposing of low level active waste and for allowing short-lived, low level radioactive waste to be held in storage until safe for disposal as non-radioactive waste. The Secretary is required to submit a report by June 1, 1981, containing his findings, conclusions and recommendations to the Speaker of the House of Representatives and the President of the Senate. Two million dollars is authorized for the study.

Committee Hearings

Committee consideration

On July 25, 1980 the Subcommittee on Energy and Power conducted a public hearing on H.R. 6390 and H.R. 7418. A total of thirteen witnesses appeared before the Subcommittee. The witnesses included the Honorable Butler Derrick, a Representative from the State of South Carolina, the Chairman of the Nuclear Regulatory Commission, representatives from the Environmental Protection Agency, the Department of Energy, the American Nuclear Energy Council and the Environmental Policy Center.

The NRC described a number of elements which it determined are needed in any comprehensive bill on waste management. These elements included (1) an extension of the NRC's regulatory authority, (2) a multiple-site characterization process prior to selecting the proposed site of the repository for permanent disposal of high level waste, including spent fuel, (3) a multistep repository licensing procedure for full State participation in the repository licensing procedure, (4) long-term storage of spent fuel and high level waste, and (5) certain additional provisions concerning the disposal of non-defense related low level waste.

The Commission contended that any comprehensive waste management legislation should clearly specify what extension, if any, of the NRC's regulatory authority Congress intended. In addition, any pilot program which focused on a few specific DOE waste management activities, but not including defense-related waste, should be established to test the feasibility of extending NRC regulatory authority on a consultive basis to DOE waste management activities not presently covered by the NRC's licensing authority. In regard to multiple-site characterization, the Commission suggested that an appropriate sequence would be an initial site screening, detailed site characterization, and, finally, construction, emplacement of waste, and closure of the full-scale repository. In the site characterization stage, the Department of Energy would select four or five promising candidate sites.

Under the NRC's suggestion, the Agency's formal licensing procedure would not begin until the Department of Energy applied for authorization to construct a repository of a specific design at a designated site. However, there would be informal NRC involvement in the site characterization effort. The formal NRC licensing procedure that was outlined in the Commission's proposed rulemaking, and which is recommended by the Commission, would consist of three major steps: construction authorization, authorization to begin waste emplacement, and authorization for final repository closure once waste emplacement is completed. The Commission did oppose incorporating specific new standards, criteria, or design

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specifications since that would restrict its ability to revise the criteria and standards as new information was developed and more experience was gained.

A key part of the entire waste management program must involve state participation. The Commission testified that it believed that a state should be allowed to object to the siting of a waste facility within its borders but only after the NRC hearing process has been completed. It pointed out that if a State could object to a site before the NRC licensing process was completed, it would create a presumption that Congress had approved that particular site. The NRC specifically testified that they opposed this provision in the introduced version of H.R. 6390. The Commission went on to testify that it believed that including a long-term retrievable storage component in an overall waste management strategy would be acceptable.

The Department of Energy witness testified that the Department had plans for at least four or five sites in at least three different geologic media to be characterized by 1985. This assumed that sufficient characterization could be achieved without the necessity of sinking exploratory shafts at every potential site and that a waste management program would be carried out in full compliance with the National Environmental Policy Act. The Department did indicate that it was its view that proceeding with unlicensed facilities at potential respository locations as proposed by H.R. 7418 (as reported by the Comittee on Science and Technology), could compromise those sites for later consideration as a full-scale repository. It pointed out that this is the case since the NRC is expected to require early involvement in all activities for sites subject to future licensing. The absence of this involvement could lessen the likelihood of NRC approval of unlicensed demonstration repositories for full-scale development. The Department also expressed the concern that a major problem with H.R. 7418 was the absence of a long-term program and the reduced emphasis on a broad scientific basis needed for subsequent licensing of full-scale facilities. It took position that "it is essential that we develop an understanding that important technical issues are being properly addressed and that selection of sites for geologic respositories is based on their suitability and not on some arbitrary requirement to meet the needs of a near term technology demonstration." The Administration advised this Committee that it is opposed to the major redirection of the President's program that H.R. 7418 would entail. It was the Administration's view that the net effect of H.R. 7418 would be to delay, not accelerate, the date of the first full-scale repository.

The witness speaking on behalf of the American Nuclear Energy Council, the Edison Electric Institute, and the Utility Neclear Waste Management Group, advised the Committee that during 1979, 72 nuclear power plants supplied the energy equivalent of the total Alaskan region oil production during that same year. By 1985 the share of electricity produced by nuclear energy should increase to approximately 20 percent of national generation as plants undergoing construction are completed or licensed to operate. The electric output of these plants would yield about 3 million barrels of oil equivalent per day. The witness indicated that one element essential to a waste policy program was the establishment of a definitive program plan with appropriate milestones, reflecting the

specific decision responsibilities of the appropriate government agencies. He testified that it was his associations' firm belief that "a Congressionally mandated directive to the Administration to take timely and constructive actions on the waste program is one essential element of restoring public confidence in the government's commitment to resolve the waste problem." He indicated that the limited sharing of information within the Federal agencies in the past had substantially contributed to the delays in establishing an effective program to date.

The witness testified further that his organizations believed a opportunity for constructive State participation is an essential element of the federal waste management program. He added, however, that an outright State veto was not in the national interest even if such a veto were coupled with a Federal override by the President or Congress. Drawing from the 1978 amendments to the Outer Continental Shelf Lands Act, his organizations developed a set of principles: (1) Potential host states should be able to participate early in the siting process but should not be able to prevent a Federal agency from performing exploratory work to identify favorable national repository sites; (2) Federal assistance should be provided to the potential host states to allow them to participate in the siting process in an informed and constructive manner; and (3) States should be provided with the opportunity to submit recommendations to the responsible Federal agency relating to environmental protection, health and safety issues, or fiscal or social impacts. The Federal agency, in turn, should advise the State in writing of the reasons for its determination to accept or reject a State's recommendations or to implement any alternative means identified.

With respect to the problem of low-level waste, it was pointed out that about 57 percent of low-level waste results from activities other than the generation of electricity from nuclear energy. For this reason, he advised going slow on a program of using existing nuclear generation plants for low-level waste processing. He also testified that he did not believe Federal legislation is needed to enable waste processing activities at power plant sites. If any impediments exist, they would arise only from potential regulatory restrictions.

Background and Need

Any activity, be it military, commercial, medical or research which produces or uses nuclear materials generates wastes which are radioactive. Although they may be in the form of a liquid, solid, or gas, all radioactive wastes have one outstanding feature in common: as long as they remain radioactive, they are potentially biologically hazardous. High level radioactive wastes are the most potentially hazardous. Some high level radioactive wastes ramain toxic for centuries, and a few remain toxic for hundreds of thousands of years. All high level radioactive wastes are man made. There is one more outstanding feature that all high level radioactive waste have in common: to date, there is no proven method for disposing of high level radioactive waste in a safe and environmentally sound manner.

It was less than thirty-eight years ago that American scientists induced the world's first continuing, self-sustaining nuclear chain reaction, and, in so doing, produced the world's first high level radioactive waste. For almost four decades now, government policies have allowed an ever increasing quantity of radioactive materials to be generated without having first demonstrated that such materials can be disposed of in a safe and environmentally sound manner. As a result, there are today stored in various parts of the country, 9, 300,000 cubic feet of high level radioactive waste and 1,225 kilograms of transuranic wastes. There are also over 2,500 metric tons of spent fuel, which contain many highly radioactive materials, stored at reactor sites throughout the nation. Over 65 million cubic feet of low level waste has been produced. Additionally, there are over 140 million tons of uranium mill tailings stored in unstable piles at the site of uranium mills, many of which have been abandoned.

Uranium mill tailings are a form of low level waste. They contain radioactive materials, and, in an unstable condition, radioactive gases resulting from the decay of radon-222 which can escape into the environment, or the radium can leach into the surface or ground water.

Although historically, most radioactive wastes were produced as part of the military program, today a majority of highly radioactive materials are being created in the course of generating electricity from nuclear reactors. Nuclear reactors use uranium fuel, and, when the uranium atom fissions, the fission process produces two new atoms, each of which has a lower atomic weight than uranium, although the combined atomic weight of atoms will be slightly less than uranium because part of the mass of the uranium atom was converted to energy. Substances produced in the course of a fission reaction which have a lower atomic weight than uranium are known as "fission products", a number of which are radioactive. The fission process also produces substances known as "transuranics", because they have an atomic number greater than uranium. Transuranics are formed when neutrons, produced in the course of the fission process, are absorbed by atoms and fuel. Transuranics are radioactive.

Radioactive materials are unstable, and, over time, decay. From a waste management standpoint, the important distinction between "fission products" and "transuranics" is the length during which each of these categories of materials remain radioactive. This is measured in terms of "half-lives" which is the period of time required for radioactive nuclide to decay to half its original value. Although there is some debate as to the number of half-lives required for radioactive materials to decay to a harmless level, with some arguing that it requires twenty half-lives, the historical rule is that it requires at least ten half-lives for most radioactive products to decay to a safe level.

For example, two of the most biologically hazardous radioactive materials are strontium-90 and cesium-137. Strontium-90 has a half-life of 28 years, and cesium-137 has a half-life of thirty years, meaning that, under the historic rule of ten half-lives, it would take approximately 300 years for these two products to become relatively harmless and, under the twenty half-lives theory, 600 years for them to achieve a harmless level. Thus, the quantities of these

two fission products in reactors which are in operation today will have to be carefully isolated at least until the year 2280, and perhaps until the year 2480. In the course of recorded history, such period of times are comprehensible. There are structures in use today which are 300 years old such as St. Peter's Basilica in Rome, which was completed over 350 years ago.

Strontium-90 and cesuium-137 are fission products. Some of the transuranics, however, have much longer half-lives. For example, plutonium-239, which is more toxic than strontium-90 or cesium-137, has a half-life of 24,500 years, meaning that it will have to be isolated for at least 245,000 years. A more complex product is americium-243, which has a half-life of 7,300 years, but which decays into plutonium-239. Thus, the toxicity of americium-243 decreases for about 20,000 years, after which it becomes more toxic than it was originally. The period of time during which some of the transuranics and antinide elements must be isolated from the biosphere is incomprehensible in terms of recorded history.

It must be recognized that the actual quantity of radioactive products produced by nuclear reactors is relatively small. A thousand megawatt reactor in operation would, in the course of a year, produce only about 2 cubic meters of radioactive waste. However, the overriding concern is not the quantity of radioactive materials produced, but rather their toxicity, and the period of time during which they remain radioactive. Thus, as stated earlier, as long as these products remain highly radioactive, they remain potentially hazardous. Exposure to and/or ingestion of even minute quantities of radioactive materials can cause biological damage. In the extreme, exposure to intense radiation can lead directly to death or cause a variety of diseases which could be fatal. Radioactive materials can also be mutagenic, resulting in the transmission of biological damage to future generations. It has been estimated that over 2 million pounds of plutonium will be produced in commercial reactors in the United States by the year 2000. It is theoretically possible that a single pound of plutonium finely dispersed, could cause an incalculable number of cancers.

When nuclear power was first being commercially promoted, it was assumed that spent fuel rods withdrawn from the reactor would be reprocessed. Reprocessing is a method by which short-lived fission products are separated from the transuranics. The transuranics would then be used as a fuel, whereby they would be consumed and transformed as part of the fission process. Although this would produce more transuranics, the process of separation and consumption could continue. As a result, only the shorter lived fission products would have to be disposed of, making the problem of radioactive waste disposal much more manageable by reducing the time in which radioactive materials would have to be isolated from the biosphere.

Reprocessing, however, was essentially a commercial activity designed to extract valuable materials from the nuclear fuel rods for subsequent use as a fuel. While the process is theoretically capable of separating all the transuranics from the fission process, it has, to date, not been successful in completely doing so. In order for this technology to be acceptable as a stage in the waste disposal process, 99.95 percent of the uranium, neptunium and plutonium, and 99 percent of the americium and curium would have to be extracted.

To date, this process has only achieved a 99.5 percent efficiency. While the difference may appear to be small, the incremental efficiency increase in efficiency from a technological standpoint is substantial. Thus, although reprocessed wastes have most of the longer lived radioactive materials removed, the remaining quantities require careful long-term isolation. Moreover, for reprocessing to be a useful state in the waste disposal process, the extracted longer-lived substances would have to be reused as a reactor fuel. The present Administration, however, has placed a moratorium on reprocesssing. However, even before this policy was announced, there were no commercial reprocessing plants in operation in the United States. Only one plant had ever operated, and its operators had closed the plant in 1972 and subsequently decided that continued operation would be unprofitable. A second plant has been constructed, but its operators abandoned the effort because of technical problems. A third plant was under construction at the time the moratorium was announced, but it was substantially behind schedule because of regulatory and technical difficulties.

Because spent fuel contains valuable minerals which could be extracted, it is argued that is is not a nuclear waste and the Committee takes no position on this issue. Given the quantities of spent fuel that will be produced before any reprocessing plant could be built, it is unlikely that all spent fuel will be reprocessed, and that some utilities may prefer to dispose of it rather than bear the cost of continued maintenance and monitoring. Additionally, some spent fuel may not be able to be reprocessed, in that its containers may have been ruptured, as was the case of one batch of spent fuel rods at the Western New York Service Center. Moreover, some spent fuel rods may be severely damaged, such as those in the Three Mile Island nuclear reactor. Thus, sound management requires that repositories be designed to dispose of spent fuel and reprocessed waste.

Thus, in order to isolate radioactive materials being produced today, the most immediately practical method under consideration is deep geologic disposal. This method involves sinking a shaft deep into a stable geologic formation, and then placing the high level radioactive materials in caverns which have been excavated along tunnels which have been mined laterally from the shaft. As each cavern becomes filled, it would be sealed off from the tunnel. Although the waste of spent fuel would be encased in containers designed to prevent the release of any radioactivity, the ability of any man-made containers to endure for a quarter of a million years is obviated by the fact that the ultimate barrier which prohibits the release of any radioactivity into the biosphere is the geologic media itself. The effectiveness of this method is dependent upon finding a geologic media whose integrity is intact, meaning that it does not have openings which would allow radioactivity to escape into the atmosphere or into the ground water. The structural integrity of the geologic media would also have to be stable enough to maintain its integrity during the period of time in which these materials remain radioactive. In geologic time, 250,000 years is not unprecedented. While it is believed that there are locations within the United States which meet these requirements, it is further believed that the number of such locations is limited. Every effort must be taken to insure that any activities leading to the establishment of a

repository does not disturb the site to the point where it is not useful for use as a repository.

Past federal efforts to establish demonstration repositories for disposing of high level radioactive waste have not been successful. The first major effort was undertaken ten years ago when the Atomic Energy Commission selected a salt deposit near Lyons, Kansas as the location of the first repository. As a geologic media, salt appeared to have many advantages, in that it is soluble, meaning that its presence indicates an absence of water, thereby minimizing the potential for water to pass through the repository and carry the radioactive contaminants into a supply system. Additionally, salt bends rather than breaks under heat, and, in the event of an earthquake, any cracks would probably heal themselves. Moreover, salt is an effective radiation shield. Unfortunately, the proposed repository site was only one-half a mile from an active salt mine, meaning that the structure had been penetrated. The formation also contained leaks, as was learned when the mine operators attempted hydraulic mining when water was pumped into the mine. During one experiment, 175,000 gallons of water disappeared in the mine. Confronted with this evidence and faced with increasing political and public opposition, the Atomic Energy Commission abandoned this effort.

Because it had concentrated its efforts in salt, and therefore knew more about salt than any other media, the Atomic Energy Commission then began to consider other salt formations and tentatively selected a site in New Mexico. Although the Federal government originally announced that the site would be used for demonstrating disposal methods for transuranic contaminated waste, the Department of Energy subsequently announced that it also intended to place spent fuel into this demonstration facility. Confusion over the purposes of the site and concern about the ability of the proposed repository to effectively contain the quantities of radioactive activity associated with spent fuel, together with the discovery of brine and gases near the survey site, led to increasing public opposition to the continuation of the project. As a result, the Administration recently announced that it was delaying the establishment of a repository at this New Mexico site until it had time to consider alternative geologic media.

In order to expand its data base and overcome past limitations resulting from relying on a single geologic media, the present Administration program calls for the initiation of site characterization activities in a number of geologic media throughout the United States. These include the Columbia River plateau flood basalts in Washington, Oregon and Idaho; the Paradox salt basin in Utah, the Delaware basin in New Mexico and Texas; the Coastal and Interior Salt Domes in Texas, Louisiana, Mississippi and Alabama; granite formation in Idaho, Montana, California, Arizona, Colorado, Wyoming, Minnesota, Wisconsin, Michigan, New York, North and South Carolina, Maine, Vermont, Massachusetts; and shale formations in Texas, Louisiana, Arkansas, Illinois, Kentucky, Ohio, Pennsylvania, Michigan, North and South Dakota, Wyoming, Nebraska, Colorado and Nevada. Characterization at these locations could continue through most of this decade, and a final site for the location of a repository would not be selected until some

time in the 1990's with construction beginning in the mid to late 1990's.

The failure of the Federal government to have successfully demonstrated that it can dispose of high level radioactive materials after nearly four decades of allowing such materials to be generated and the recently announced proposal to delay the establishment of a repository for as much as two more decades, has resulted in the erosion of public confidence in the ability of the government to prove that it can dispose of these materials. Additionally, continuing delays in the actual establishment of a repository are causing the erection of an increasing number of institutional barriers to the expansion of nuclear energy.

For example, in a number of states, statutory or regulatory restrictions have in effect prohibited the construction of new nuclear power plants until it has been established that the waste materials generated by the operation of such plants can be disposed of safely. In other states, restrictions have been imposed on the length of time spent fuel can be stored within a state. Even in the absence of state restrictions, the unresolved issue of the disposal and the question of the long-term storage of spent fuel at the reactor site is being raised in the context of new nuclear power plant licensing proceedings.

Institutional barriers are not only being erected against the generation of additional quantities of radioactive materials, but also against the establishment of a repository for disposing of such materials. A number of states have enacted laws either prohibiting the location of a repository within the state or requiring that the Governor, the State Legislature, or both, approve the location of a repository within the state. Some states and local communities have prohibited the transportation of high-level radioactive materials of spent fuel through the state or local communities or imposed severe restrictions on such transportation.

The establishment of these institutional barriers is a result of an increasing public perception of the hazards of radioactive materials as well as the growing concern that the failure of the federal government to have yet successfully demonstrated methods of disposing of nuclear materials and of the criticism of proposals of disposing of such materials is evidence that radioactive materials cannot be disposed of safely.

Continued delays in establishing that radioactive materials can be disposed of safely and in an environmentally sound manner can no longer be tolerated. This is important not simply because of the effect the failure to demonstrate that radioactive materials can be disposed of safely will have on the licensing of nuclear power plants, but also because it is no longer acceptable to allow increasing quantities of nuclear waste to be stored on an interim basis. The existence of these wastes in their present form poses a growing hazard which cannot be allowed to continue indefinitely. It is essential that an orderly and timely federal program be established to properly address this aspect of the nuclear issue. Whatever the future of nuclear energy, radioactive wastes exist, and their existence in this state poses a serious hazard until it can be successfuly isolated from the biosphere.

COMMITTEE COMMENTS

H.R. 7418, as introduced, was primarily oriented toward establishing a demonstration program. However, the text of the bill contained certain elements which, in this Committee's view, transcended the demonstration orientation of the bill, and raised issues which were within the jurisdiction of this Committee and the Committee on Interior and Insular Affairs. Because of this, the Committee sought sequential referral of the bill. Under an agreement with the Chairman of the Committee on Science and Technology, the bill was sequentially referred to this Committee for consideration of such matters as are within the jurisdiction of this Committee. In considering the bill, the Interstate and Foreign Commerce Committee has attempted to respect the jurisdictional matters within the purview of the Science and Technology Committee, and to confine its considerations to those matters which transcend the area of research and development.

Site selection criteria

As introduced, H.R. 7418 directs the Secretary of Energy to "identify four regionally distributed repository sites in the continental United States, at least one of which will be located in each of the eastern, central and western regions of the United States." The Committee on Science and Technology's report (H. Rept. 96-1156, Part 1) states that "the major regions of the nation are loosely defined in order to provide the Department with latitude to distribute the four sites across the nation. The Department may consider boundaries somewhere in the zone between 85 degrees and 90 degrees latitude for the eastern central boundary and somewhere in the zone of 105 to 110 degrees latitude for the central western boundary." This Committee assumes that the intended boundaries would be longitude, rather than latitude. As secondary criteria, the bill directs the Secretary to consider sites which include, but are not limited to, the following geologic media: basalt, tuff, granite and salt. Thus, under the terms of the bill, the Secretary is required to select sites solely on the basis of the fact that they are located in different regions of the country, and in selecting such regionally distributed sites, to merely consider diverse geologic media.

This Committee believes that regional distribution of repositories are policy matters which relate to the siting of energy related facilities and bear no relation to research, and development and demonstration functions. Under the criteria proposed by the Committee on Science and Technology, it would be theoretically possible for the Secretary to construct four identical demonstration repositories in the same geologic media, thereby undermining the demonstration orientation of the program and resulting in the needless expenditure of funds by constructing duplicative facilities.

The Committee recognizes that each sector of the nation should assume responsibility for disposing of radioactive waste which results from the generation of electricity which benefits that sector. Many believe, however, that the need to effectively and safely isolate radioactive isotopes from the biosphere requires that the Secretary select sites on the basis of scientific criteria, and that this is

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such an essential element of disposing of radioactive waste that it must take precedence over regional considerations.

To attain this objective, this Committee has amended the bill by requiring that the Secretary select sites in different geologic media, which, to the extent practicable, are to be located in different regions of the nation. This change not only enhances the ultimate success of the program by increasing the Secretary's knowledge of multiple geologic media, and thereby increases the options, but is consistent with the stated demonstration orientation of the program. The Department's past emphasis on a single geologic media, salt, has been a major impediment to the establishment of a repository, for, after one site was eliminated, the Secretary was forced to seek an alternative site in the same geologic media because the Department lacked sufficient data to consider sites in alternative media.

By requiring the Secretary to select sites in different geologic media, and by prohibiting him from constructing more than one demonstration repository in the same geologic media, the Committee amendment would expand the Secretary's knowledge. If one medium were found to be unacceptable, the progress of the program would not be delayed because explorations of alternative media were proceeding simultaneously.

Moreover, the multiple media approach could improve the potential for regional distribution, for the various geologic media are geographically distributed. The most promising basalt formation is located in the State of Washington. The Committee expects that the Department will vigorously pursue its ongoing activities at the Hanford Reservation site which is ideally suited for use as a repository because of the past and present nuclear activities which have occurred on the site and which have rendered it virtually useless for alternative purposes. The existing contamination of the site virtually precludes it ever being used for any other purpose, and the Committee suggests this be a primary site.

The Interior Salt Domes, the Coastal Salt Domes and the Gulf Coast clays in the State of Louisiana have many advantages which warrant accelerated consideration and which make them prime candidates for selection as repository sites. Additionally, the central location of Louisiana and the state's access by existing transportation systems provides special advantages.

The Mid-Continent shales in Ohio and the Appalachian Basin in Pennsylvania have geographic advantages because they are located near the major concentrations of nuclear power reactors. The location of a repository in these two states would substantially reduce the dangers imposed by the long transportation of high-level waste.

The basalt formations in the Delaware Basin in New Mexico and northwest Texas are already under serious consideration and include the proposed waste isolation pilot plant site. The Idaho Batholith is also a serious potential site, especially because of the proximity of the existing federal nuclear facility in Idaho.

Licensing of high-level radioactive waste demonstration repositories

Section 3(g) of the bill, as reported by this Committee, states that all demonstration repositories are to be constructed and operated as research, development and demonstration facilities pursuant to section 202 of the Energy Reorganization Act of 1974. The purpose

of this section is simply to clarify that these facilities are subject to the provisions of section 202, but not to interpret what the requirements of section 202 are. The Committee believes that this section of the law and its legislative history have a clear meaning that does not require interpretation in subsequent statutes and it is this Committee's intent that section 202 apply fully.

However, as introduced, H.R. 7418 contained a provision, section 3(5), which states that "Consistent with existing law, all demonstration facilities authorized in this section shall be constructed and operated as non-licensed research, development and demonstration facilities." Section 3(5) then did not merely state that the applicable law would apply, without reference in the bill to what statute is contemplated, but went on to provide an interpretation of the present status of existing law in regard to the issue of licensing. This Committee does not intend to define the licensing requirements contained in previously enacted statute within the context of this bill, and has therefore deleted section 3(5) and substituted in its place an amendment simply referencing this applicable provision of law and stating that such a provision will apply.

The substitution of a provision which specifically references section 202 of the Energy Reorganization Act for a prior provision in H.R. 7418 which sought to interpret the effect of section 202 raises questions regarding the pending bill's legislative history, for this Committee's substitute may be viewed as a technical improvement of the section in the bill as introduced, and thereby interpreted as implying that this Committee concurs in the interpretation expressed in section 3(5) to the effect that existing law is that demonstration facilities would be constructed and operated as non-licensed facilities. This Committee is willing to allow the relevant provisions of existing law apply without prejudging the effect of their applicability within the context of the pending bill.

National Environmental Policy Act

H.R. 7418, as reported by the Committee on Science and Technology, would exclude the site selection and site characterization activities from the application of the requirements of section 102(2)(C) of the National Environmental Policy Act of 1969 by declaring that, "None of the activities in this subparagraph including the excavation for shafts shall be considered a major Federal action pursuant to subsection 102(2)(C) of the National Environmental Policy Act of 1969."

It must be noted at this point that this exemption was added as an amendment during the course of the Committee on Science and Technology's consideration of the bill. According to the text of the amendment, the section in which this was to be inserted was section 3(1), relating to the site selection process and site characterization activities. However, in the Committee on Science and Technology's report, there is printed on pages 4 through 9 the text of bill as amended, and in that text the amendment is inserted in section 3(2), rather than section 3(1). The effect is considerable, in that section 3(2) would exempt the design, construction and operation of demonstration repositories, and thus its insertion within section 3(2) would exempt the design, construction and operation of demonstration repositories from the requirements of the National Environmental Policy Act. While noting that the difference is substan-

tial, this Committee will assume that the text of the amended bill, as it appears in the report, is incorrect, and the exemption is intended to apply to section 3(1).

In explaining the intent of this provision the Committee on Science and Technology's report states:

> The bill clarifies that none of the activities under Section 3, up to the decision to build a demonstration repository, shall be considered to be a major Federal action. This states a rational interpretation of the requirements of the National Environmental Policy Act of 1969, as amended, (NEPA), so as to avoid potential delaying tactics in implementation of the program. This action also corresponds to the determination in the NRC proposed rule in its "Disposal of High-Level Radioactive Wastes in Geologic Repositories; Proposed Licensing Procedures" and with other site-characterization practices and is a logical operational procedure. Full-size shafts are expected to be required for equipment access for underground site characterization. The Committee directs and authorizes the Department to be in compliance with the National Environmental Policy Act and to conform to schedules by starting preparations of a draft environmental impact statement (DEIS) at the time when each site is identified and to prepare the DEIS covering the proposed design and operation of the repositories while excavation for shafts and site characterization are underway. The schedule for environmental impact statements should minimize any time delay between site characterization and the possible start of construction of the demonstration repositories.

While the intent appears clear, the first sentence is technically incorrect, in that the amendment does not declare that none of the activities under section 3, up to the decision to build a demonstration repository, shall be considered to be a major federal action. Such an interpretation would exempt all the activities authorized under section 3(3) relating to solidification activities from compliance with NEPA, until such time as the Secretary decides to construct a demonstration repository. The amendment is clear in that it applies only to a particular subsection of section 3 and not to the section as a whole although, based upon its appearance in section 3(2) of the bill as it appears in the Committee report, there is apparently confusion as to precisely which subsection of section 3 it belongs.

This Committee disagrees with the statement that none of the activities prior to the decision to build a demonstration repository are to be considered a major federal action, and rejects the statement that such a policy ". . . states a rational interpretation of the requirements of the National Environmental Policy Act of 1969 as amended (NEPA), so as to avoid potential delaying tactics in implementation of the program." The implication that NEPA's main purpose is to impose potential delaying tactics, and that the benefits derived from full compliance with NEPA do not warrant such compliance is a proposition which fails to recognize the significance of this Act. this is a theory with which this Committee does not concur.

Clearly, the selection of a site as the location of a demonstration repository into which high-level radioactive waste will be placed is a major federal action which would significantly affect the quality of the human environment. This is particularly true within the context of H.R. 7418, as reported by the Committee on Science and Technology in that, under the terms of the bill, once the Secretary selects a site pursuant to section 3(1), he must, under the terms of section 3(2), construct a demonstration repository at that site. Thus, under the bill, the selection of a site is synonymous with a decision to construct a repository at that site. The construction of a repository at a site selected under section 3(1) is mandated by the requirements of section 3(2). Given the consequential results, as required by the bill, the selection of a site is indistinguishable from a decision to construct a demonstration repository at that site, and thus the site selection is the operative major federal action.

One of the most important issues concerning compliance with NEPA is the question of when an Environmental Impact Statement (EIS) is to be prepared. NEPA requires each Federal agency to establish a technology assessment process whereby environmental issues would be considered before all options are closed, before the project momentum becomes irresistible and before an agency or department's commitments to a particular project or course of action are firm. The statute itself states that an EIS is to be part of "every recommendation or report on proposals" on legislation or other actions with environmental effect. Since an EIS is to accompany a "proposal", it must be preformed when the course of action is tentative, and thus precede the actual decision to proceed.

In the context of section 3 of H.R. 7418, as reported by the Committee on Science and Technology, the decision to proceed with the establishment of a demonstration repository is made at the time the site is selected. The Council on Environmental Quality guidelines state that draft EIS "should be prepared and circulated for comment prior to the first significant point of decision in the agency view process." (40 CFR, section 1500.7(a)). The requirement that an EIS include a study of "alternatives to the proposed action" and an assessment of the effects "which cannot be avoided should the proposal be implemented" reinforces the argument that the statement is to be issued before the decision is final. The requirement of an EIS is to insure that the agency seriously assesses the environmental impacts, and not subsequently rationalizes decisions which were previously made. In *Calvert Cliffs' Coordinating Committee* v. *the Atomic Energy Commission* (449 F. 2d 1109, 1118, 1972) the court declared that:

> Compliance to the "fullest" or greatest possible extent would seem to demand that environmental issues be considered at every important stage of the decisionmaking process concerning a particular action—at every stage where an overall balancing of environmental and non-environmental factors is appropriate and where alterations might be made in the proposed action to minimize environmental cost.

In *Scientist Institute for Public Information* v. *the Atomic Energy Commission* (481 F2d, 1079, 1092 (1973)), the court declared that "Statements must be written late

> enough in the development process to contain meaningful information, but they must be written early enough so that whatever information is contained can practically serve as an imput into the decisionmaking process."

This need to provide useful information raises the question of when should the decision to select the repository site be made. H.R. 7418, as reported by the Committee on Science and Technology, requires that the Secretary of Energy select the first two sites by the end of the first quarter of fiscal year 1981, which would be by December 31, 1980. This timetable would preclude the Secretary from initiating any substantial site characterization activities prior to the selection of the initial sites. Thus, the Secretary would be making a decision on the basis of incomplete information, and this would prejudice the decision in favor of those sites about which the most is already known. If the Environmental Impact Statement were prepared at the time of construction, the review of the adequacy of the site selection and consideration of alternative sites would be deferred until late in the process. Given the limited time in which the Secretary is given to make such a decision, the validity of that decision would be vulnerable to court challenge and the program could be seriously delayed.

In its consideration of H.R. 7418, this Committee adopted an approach which is designed to meet the requirements of NEPA without prematurely foreclosing the Secretary's options. Under the bill as reported by the Committee on Interstate and Foreign Commerce, section 3(b)(1) directs the Secretary to select potential sites for demonstration repositories. The first two potential sites are to be selected by the end of fiscal year 1981. Under section 3(b)(3)(A), the Secretary is then authorized to undertake the necessary site characterization activities at these sites, and any other sites which seem suitable. A definite timetable is established for the selection of preliminary action. Under section 3(b)(4), the Secretary is directed, as soon as practicable, to make the final selection of sites for demonstration repositories, subject to the requirement that such selection be made by such a date as may be necessary to enable the Secretary to meet the time deadlines for the operation of a repository established in other sections of the Act. Consequently, the preliminary site selection under section 3(b)(1) would not be a final action, and the proposal for such action would be pursuant to section 3(b)(4), following the site characterization activities authorized under section 3(b)(3)(A). As a result, any potential site selected under section 3(b)(1) would not necessarily be a site selected under section 3(b)(4) for, under the amended bill, the Secretary is not required to construct the repository at a site that is selected pursuant to section 3(b)(1). By separating the preliminary designation of a site from the decision to construct a repository, the Secretary's options are not automatically foreclosed, and he is then given the flexibility to conduct the needed technology assessment and consider appropriate alternatives, as required by the National Environmental Policy Act. Consequently, the validity of the Secretary's decision is less vulnerable to judicial challenge, and thus the potential for delay is minimized.

The establishment of a formal relationship among the Department of Energy and the Nuclear Regulatory Commission and the State

In its report on H.R. 7418, the Committee on Science and Technology encourages the Department of Energy to have preliminary and continuing consultations with the Nuclear Regulatory Commission at all stages of the design, construction and operation to assure that the Commission has full opportunity to provide comments and suggestions. The report also states that the Committee expects the Department to appropriately consider these comments and where appropriate within the constraints of schedule, budget and effects on the total operation, to incorporate them into the final construction.

Consistent with these objectives, this Committee has adopted an amendment to H.R. 7418, which appears as section 3(e), which directs the Secretary of Energy to enter into an agreement with the Nuclear Regulatory Commission which will assure that the Commission has the opportunity to review and comment upon the Department's plans for the design, construction and operation of all demonstration repositories, and that the Commission receives all safety analysis reports together with any other information the Commission may require regarding any danger to the public health and safety which may be presented by the implementation of the program. Furthermore, this agreement is to include a provision which assures that the Commission, during the course of this program, has access to all demonstration repositories for the purpose for assuring that the public health and safety are fully protected. The purpose of this amendment is to provide a mechanism for cooperation between the Department and the Commission, and is intended to be independent of Section 3(g). During the course of the Subcommittee on Energy and Power's hearings on H.R. 7418, witnesses representing both the Nuclear Regulatory Commission and the Department of Energy stressed the need for early Commission involvement in the process. The Chairman of the Nuclear Regulatory Commission, John Ahearne, stated that:

> One of the concerns is that in the development of large scale demonstration facility, by the time the whole facility has been developed and operated for some time, you may have precluded making fundamental changes and major changes to that facility, and if, as a result of the licensing review, the conclusion was that in the absence of those changes that would not be an acceptable facility, you may well have thereby compromised, and compromised fatally, a very acceptable site.

Dr. Cunningham, Assistant Secretary for Nuclear Energy, Department of Energy, stated that:

> With regard to technology development, the major emphasis of H.R. 7418 is on technology-demonstration facilities to confirm the existence of safe reliable processes for the permanent disposal of high level waste. It is our view that proceeding with unlicensed facilities as a potential repository location, as proposed by H.R. 7418, could compromise these sites for later consideration as full-scale reposi-

tories. This is particularly true since the NRC is expected to require early involvement in all activities for site subject to future licensing. Absence of this involvement could lessen the likelihood of NRC approval of unlicensed demonstration repositories in full scale development.

Because of the potential that the Department's activities at any site may compromise the subsequent use of that site as the location of a full scale repository, this Committee has added the requirement that the agreement include a provision which prohibits the Secretary from undertaking any excavations, either as part of site characterization activities or in conjunction with the construction of the repository at a proposed site without first receiving the concurrence of the Commission. This will provide the Commission with the authority to insure that none of the Secretary's site related activities which disturb the integrity of the geologic media will render the site useless for subsequent use as a full-scale repository.

This Committee recognizes that interagency agreements are often difficult to negotiate, and believes that, in a matter of such importance, the essential provisions of such agreements should be included in the legislation itself, rather than the Committee report, not simply to stress the importance of such agreements, but also to facilitate their attainment. It is not the intent of the Committee to limit the interagency agreement to only those requirements specified in the legislation, for the Committee recognizes that the Commission and the Department must work cooperatively and respect the statutory responsibilities of each other in regard to such projects. Rather, it is the Committee's intent to require that the Department work with the Commission to establish a mechanism which will facilitate the execution of their respective statutory responsibilities.

In the course of this Committee's deliberation of H.R. 7418, Representative Ottinger offered an amendment which further clarifies the Commission responsibilities by vesting it with an independent authority to issue an order directing the Secretary to cease any activity or take corrective action whenever the Commission determines that any action of the Secretary poses a danger to the public health and safety. The issuance of any such order is to be followed as soon as practicable by a hearing, after which the Commission is either to affirm, revise or rescind its order. The Secretary may not take any activity which is prohibited by an order of the Commission. This amendment therefore reaffirms the existing law that the Nuclear Regulatory Commission has the ultimate responsibility for protecting the public health and safety in regard to radiological matters, and also assures that there is an independent review of the Secretary's actions. Moreover, the Commission's resolution of health and safety disputes is consistent with historical consideration of such issues. For example, in the past, when differences developed within the former Atomic Energy Commission between the development branch and the regulatory division, as was the case in regard to the Fast Flux Test Facility, the regulatory division could prevent the development branch from proceeding until the full Commission had considered and acted upon the issue in dispute. The Committee believes that this amendment, which appears in the bill as section 3(h), is consistent with past practices in that, if the Commission truly believes that a particular action of the Secre-

tary poses a danger to the health and safety, the Commission should have the clear authority to exercise its statutory responsibilities and be able to act effectively to protect the public health and safety.

The Committee also expanded the Secretary's responsibilities in regard to the involvement of the states in the implementation of this program. Section (f) of the bill now directs the Secretary to consult and cooperate with each state in which the Secretary proposes to construct a repository. The Secretary is specifically required to notify the Governor of any state in which is located a site on which the Secretary intends to locate a repository or the Secretary's interest in that site. Moreover, the Secretary is required to conduct a public hearing in the vicinity of any site which the Secretary proposes to designate a potential repository site pursuant to section 3(b)(1) and to hold a hearing within the vicinity of any site which the Secretary proposes to select as a final repository site pursuant to section 3(b)(4). Such public and state involvement is designed to insure that state officials and local residents are fully informed of the Secretary's intention and afforded the opportunity to review and comment on the Secretary's proposal. Prior federal efforts have demonstrated the importance of such early state and public involvement, and the Committee believes that the requirement for such involvement should be contained in the statute itself. The statutory requirements are intended to be minimal, and the Secretary is encouraged to work with all affected state and local officials, Indian tribes, and members of the public at every stage of the program, and that every effort be made to resolve all outstanding issues before the initiation of any significant action, including site characterization activities. The Committee expects that the Secretary will afford such officials and groups every opportunity to present their views and that an effective mechanism will be established to assure that their concerns are fully considered and addressed.

Relationship of H.R. 7418 to other pending legislation

At the conclusion of its action on H.R. 7418, this Committee began consideration of H.R. 6390, which would establish a program within the Department of Energy leading to the construction and operation of a full-scale repository by the mid-1990's. As introduced, H.R. 7418 is designed to establish a demonstration-oriented program which would lead to the construction of temporary, small scale repositories. An amendment to such a bill which would authorize the construction and operation of a full-scale repository would not be germane to legislation establishing merely a demonstration program. Similarly, an amendment creating a demonstration program would not be germane to legislation which establishes a program leading to the construction and operation of a full scale repository. Thus, the Committee considered these bills separately.

The approach encompassed in each bill is fundamentally different, and consequently each would produce a very distinct result. As introduced, H.R. 7418 was designed to lead to the selection of four regionally distributed demonstration repositories, the first of which would be operational by 1986. Although it would be difficult to meet this deadline, the significance of achieving the goal within the context of the bill would be questionable, in that the terms of

the bill, as introduced, are designed to require that the Secretary design and construct these demonstration repositories outside the framework of the Nuclear Regulatory Commission's licensing process. Consequently, while a demonstration program would produce some interesting data which would be useful in designing full scale repositories and in establishing the needed regulatory framework for such repositiories, its results would be nonconclusive, in that it would still be open to question as to whether the Department of Energy could dispose of radioactive materials in a safe and environmentally sound manner, which would mean complying with all applicable regulatory requirements.

Furthermore, the injection of a demonstration phase into the radioactive waste management program could not only compromise a potential site for use as the location of a full scale repository by disturbing the integrity of the geologic media, but could also delay the establishment of a full scale repository. The Department of Energy has stated that "the net effect of H.R. 7418 would be to delay, not accelerate, the date of the first full scale repository." This would be a consequence of not simply establishing a new stage in the process, but also of authorizing the continuation of the demonstration phase until the year 2000. By so doing, the bill is implying that the demonstration aspect is to proceed until sufficient information is gathered. As the bill presumes that such information would not be obtained until the year 2000, it could be argued that the completion of the demonstration phase should be a condition precedent to the establishment of a full scale repository. This would mean that any application for a construction permit for a full scale repository would have to be delayed until after the turn of the century, with the result that a full scale repository would not be in operation until about the year 2010.

Delays in establishing that radioactive material can be disposed of in a safe and environmentally acceptable manner are already resulting in the creation of an increasing number of institutional barriers to the expansion of nuclear energy. Programs which would further delay the establishment of a full scale repository must be carefully evaluated in terms of their short- and long-term consequences.

This Committee believes that it is important that the issue of radioactive waste disposal be resolved as expeditiously as possible, and that the only final resolution of this issue rests with the commencement of operation of a full scale licensed facility. To achieve this objective, the Committee has reported an amended version of H.R. 6390, which establishes an accelerated and orderly program leading to the construction and operation of a full scale licensed repository.

While the Committee intends to make every effort to resolve differences with other committees which are considering H.R. 7418 and H.R. 6390, the Committee is cognizant that the limited time remaining in the legislative session may not allow for the resolution of all issues and the full consideration of both bills. In the event that compromise is not attainable on both bills, and time allows for consideration of only one, this Committee's clear preference is towards legislation which would lead to the expeditious establishment of a full scale licensed repository.

Low-level waste

The problem of low level waste disposal has been of concern to this Committee for some time. In its consideration of H.R. 6390, the Committee adopted an amendment which clearly places the responsibility for low level waste management upon the states, and which established a mechanism for assisting them in meeting their responsibility.

The Committee recognizes that there is much which can be done to significantly reduce quantities of low level waste which are being produced today, and that a program addressing such an issue needs to be defined. The Department of Energy already has the requisite authority to conduct a low level waste research, development and demonstration program, and thus, it is unnecessary to authorize the establishment of such a program within the context of this legislation.

The Committee supports the initiation of a study to consider alternatives to the present system of disposing of low level waste and believes that it is important that greater attention be given to methods for reducing the volume of such waste. Consequently, this Committee has adopted an amendment authorizing the study of methods for disposing of low level wastes and reducing their volume which is similar to the one adopted by the Committee on Science and Technology.

Dry storage of spent fuel

Under the rules of the House, the version of H.R. 7418 which was sequentially referred to this Committee was the bill as introduced. Consequently, this Committee did not have before it for consideration the bill as reported by Science and Technology. However, this Committee is aware of the actions taken by the Committee on Science and Technology during the course of its consideration of H.R. 7418.

One of the amendments which was adopted by the Committee on Science and Technology relates to the establishment of a demonstration progran for the dry storage of spent fuel. Presently, spent fuel is stored in large pools of water, and the water serves not only as a cooling medium but also as a radioactive shield. Clearly, spent fuel which has recently been withdrawn from a reactor's core should be stored in water. However, after a period of time, the danger of a release of radioactivity from properly encased spent fuel is substantially reduced and thus, it is not necessary to continue to store the spent fuel in water.

Although wet storage is a proven and accepted technology, there is growing evidence that dry storage may have significant cost advantages. In the course of its consideration of H.R. 6390, this Committee was prepared to consider and amendment which would establish a cooperative program between the Department of Energy and certain utilities leading to the creation of some licensed, prototype, at-reactor dry storage spent facilities. However, in an effort to report H.R. 6390 in a timely manner, the sponsors of this amendment deferred consideration of this issue with the intention of offering an amendment on the Floor during the course of the House's consideration of H.R. 6390. Because of the potential economic advantages of this technology, this Committee does not believe that the establishment of dry storage facilities should be delayed, and

therefore supports a program which would lead to the expeditious establishment of on-site dry spent fuel storage facilities.

SECTION-BY-SECTION ANALYSIS OF THE BILL

Section 1 states that the bill is to be cited as the "Nuclear Research, Development, and Demonstration Act of 1980".

Section 2. Findings and purposes

Subsection 2(a) contains the findings of the Congress. These findings are that (1) the efforts made in the last thirty years to devise a permanent solution to the problems of nuclear waste disposal have not been adequate; (2) that only the Federal Government has the capability to provide for the permanent disposal of high level radioactive waste which has been produced from military and commercial activities; (3) that the accumulation of such waste from military and commercial activities, from activities relating to medical research, diagnosis, and treatment and from other activities, including research and development activities, are a national problem; (4) that although recent scientific studies and the majority of scientists assert that high level radioactive wastes generated through the use of nuclear technologies can be disposed safely with no significant impact on the public health and environment, no method for disposing of such waste has ever been demonstrated; (5) that research, development and demonstration is a desired prerequisite to confirming the existence of a safe and reliable process for the uitimate disposal of high level radioactive waste; (6) that the development of a safe and timely solution to the problem of high level radioactive waste disposal is essential if nuclear power is to make a significant contribution to the future energy requirements in the United States; and (7) the demonstration of safe and reliable processes for the disposal of the high level radioactive waste will aid the Nuclear Regulatory Commission in establishing regulations governing the design, construction and operation of the repositories.

Subsection 2(b) contains the purposes of this Act. These purposes are (1) to establish a directed and orderly research, development, and demonstration program within the Department of Energy for the disposal of high level radioactive waste; (2) to seek to confirm the existence of technological solutions for safely disposing of high evel waste; and (3) to develop the experience, data and information necessary for the Secretary of Energy to build and operate full-scale high level radioactive waste repositories.

Establishment of a high-level radioactive waste program

Section 3(a) directs the Secretary of Energy not later than 60 days after the date of enactment of this Act to establish a research, development, and demonstration program for the disposal of high level radioactive wastes, which program is to include integrated technology demonstrations and which is to be implemented in accordance with this section.

Paragraph 3(b)(1) directs the Secretary of Energy to identify four potential sites within the continental United States which appear suitable for the subsequent construction of a demonstration repository. The purpose of this subsection is merely to identify sites

which, in the Secretary's opinion, warrant further study to determine if they are indeed suitable for use as a location of a demonstration repository. The identification of any potential site under this subsection does not preclude its subsequent elimination from further consideration. The establishment of the time for selecting a potential site is merely to insure that certain actions are taken within a specified timeframe, and is not meant to preclude the Secretary from considering additional sites. On the contrary, the Committee expects the Secretary to make every effort to continue to explore additional potential sites so that, in making the final site selection, the Secretary has available the maximum number of alternatives. Two potential sites are to be identified not later than the fourth quarter of Fiscal Year 1981, and two additional potential sites are to be identified not later than the end of Fiscal Year 1983.

Consistent with the demonstration orientation of this program, subsection 3(b)(2) requires that each potential site be located in a different geologic media, such as basalt, salt, salt domes, and granite, and to the maximum extent practicable, be located in different regions of the United States. Thus, in selecting potential sites, the Secretary is to give primary consideration to demonstrating the ability to dispose of radioactive materials in a variety of geologic media so that data can be obtained as to the suitability of each geologic media as an ultimate barrier in containing radioactive materials. Regional distribution is clearly to be a subordinate consideration.

Under section 3(b)(3)(A) the Secretary is directed to initiate site characterization activities at each proposed site which is under consideration for use as the location of a demonstration repository in order to determine the suitability of that site for such use. Such site characterization activities are defined to include borings, surface excavations, excavations for exploratory shafts, and *in situ* testing needed to determine the suitability of the site for use as a geologic repository.

The Secretary is also directed, under section (b)(3)(B), to conduct such tests as may be necessary at each site under consideration to provide the data needed in compliance with the National Environmental Policy Act and to report to the Commission the information developed from such tests. Thus, it is the Committee's intent that the Secretary have the clear authority to simultaneously proceed with site charaterization activities and to gather such information as may be required for NEPA, under the belief that most of the site characterization activities are preliminary actions leading to the formulation of a proposal regarding the designation of a particular site as the one upon which the demonstration repository would be constructed.

All site characterization activities in the site selection process itself in both the preliminary and final stages are to be based upon the premise that the geologic media is to be the ultimate barrier which isolates the waste from the biosphere, and that engineered barriers are but intermediate and short-term forms of isolation. Moreover, for the purposes of this Act, high level radioactive wastes are defined to include not only reprocessed waste, but also spent fuel. It is the Committee's belief that for any demonstration program to be of practicable benefit, it must be capable of demonstrating that all forms of radioactive materials can be disposed of

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safely and that all demonstration repositories must be designed to the maximum rather than the minimum standard. By so doing, it is not the intent of this Committee to prejudge the issue of reprocessing or in any way to foreclose the potential that reprocessing may one day be recognized as a useful method for conserving valuable resources. Instead, the Committee is primarily interested in establishing realistic parameters for a responsible and cost effective radioactive waste management program. It is the Committee's firm belief that, regardless of the outcome of the current debate on reprocessing, some quantities of spent fuel will ultimately be placed in a repository, and that prudent management requires that such an eventuality be incorporated in the site selection and repository design and construction process at the earliest possible stage.

After having conducted all necessary site characterization activities at each site identified pursuant to section 3(b)(1), and any other site subsequently considered by the Secretary to be suitable, the Secretary, under section 3(b)(4) is directed, as soon as practicable, to make the final selection of sites for the demonstration repositories, subject only to the requirement that the selection being made by such date as may be necessary to enable the Secretary to meet the time deadlines established by the Act for the operation of the demonstration repositories.

Subsection 3(c)(1) directs the Secretary to design, construct and operate at each of the sites selected by the Secretary under subsection 3(b)(4) a demonstration repository for the disposal of high level radioactive waste. As previously stated, any such design, construction and operation of a demonstration repository is to be based upon the assumption that the geologic media is to serve as the ultimate barrier isolating the radioactive materials from the biosphere, and that the material to be placed in such a repository is to include not only reprocessed waste but spent fuel as well. The Secretary is directed to have the first demonstration repository in operation by the end of Fiscal Year 1986 and the second demonstration repository in operation by the end of Fiscal Year 1987. The third and fourth repositories are to be in operation by such times as may be prescribed in legislation enacted after the date of enactment of this Act.

Subsection 3(c)(2) provides that any demonstration repository constructed by the Secretary be no larger than is appropriate to conduct the necessary activities to demonstrate that high level radioactive waste can be disposed of in geologic media, taking into consideration the necessary handling, engineering, space, configuration and heat dissipation of such waste, with the limitation that any respository have the capacity for receiving a maximum of 40 metric tons of waste. Under this subsection, any demonstration repository may be mined at depths and shall be constructed with methods similar to those which would be used in the construction of full-scale repositories.

The intent of section 3(c)(2) is to reinforce the demonstration orientation of this program by limiting the size of any such demonstration repository to no larger than is needed to obtain the required data. To achieve this objective, the Committee has specified that any demonstration repository have the capacity for receiving a maximum of 40 metric tons of radioactive materials. This is consistent with the views expressed by John Davis, Deputy Director,

Office of Nuclear Materials Safety and Safeguards, Nuclear Regulatory Commission, in a June 3, 1980, memo to Carlton Kammerer, Directir, Nuclear Regulatory Commission, Office of Congressional Affairs, wherein he stated " . . . we believe the minimum of 40 canisters of waste at each facility may be excessive for demonstration proposes and suggest that the demonstration phase be scaled down to a minimum technically needed for the particular demonstration." Consistent with this view, the Committee adopted a maximum limitation of 40 metric tons because a metric ton is a defined and quantifiable term, while the term "canister" has not yet been defined in this context, and therefore is a meaningless criteria. The Committee wishes to reiterate its intention that the 40 metric ton measurement is to be the maximum quantity of materials to be placed in a repository, and that the overriding criteria which the Secretary is to achieve is the minimum amount which is technically needed for the particular demonstration.

Moreover, section 3(c)(2)(C) does not require that any demonstration repository be mined at the actual depth of a full scale repository, but instead vest the Secretary with the discretion to select the depth which may be appropriate for the demonstration purpose. The Secretary is required to construct any demonstration repository which would essentially include the lateral excavation in associated caverns, with methods similar to those which would be used in the construction of a full scale repository.

Subsection 3(c)(3) provides that no wastes are to be placed in the demonstration repository under this program unless (a) the waste is high level radioactive waste which is owned by the Federal Government and is the result of unlicensed activities, (b) the waste is retrievable from the demonstration repository, and (c) a place certain which is physically capable of receiving the waste has been identified to receive the waste after the termination of the program.

The intent of section 3(c)(3) is to avoid any unnecessary complications which may result from implacing licensed waste in a demonstration repository, in that such licensed wastes are under the exclusive jurisdiction of the Nuclear Regulatory Commission. The requirement that only unlicensed waste be placed in a demonstration repository would obviate any legal issues which may be encountered regarding the ownership of such materials and the appropriateness of using them in a demonstration facility, the status of which may be subject to question. The requirement that any waste placed in such a repository be retrievable is essential to reinforcing the demonstration orientation of this program. The inclusion of the provision that, before any waste can be placed in a demonstration repository, a place certain which is physically capable of receiving the waste has been identified to receive the waste at the termination of the program, is to reinforce the concept that this is a demonstration program and that, at its conclusion, the waste will be removed, so that there are no institutional barriers which will require that the waste continue to be stored in a facility that is not designed for such extended storage. The inability of the federal government to find suitable places for the removal of waste is an impediment to the establishment of additional storage sites, and it is expected that this requirement will facilitate the cooperation of state and local governments in the establishment of demonstration

repositories by providing them with additional assurance that any waste placed in such a repository can be removed.

A place certain is to be strictly interpreted to mean a facility which is in existence prior to the emplacement of any waste at a demonstration repository and which is to continue in operation during the course of the demonstration and which has an existing physical capability for receiving these wastes. This requirement is also designed to insure that, in the event that some unanticipated event requires the premature termination of the demonstration, the waste can expeditiously be removed from the site.

By imposing these prerequisites on the implacement of radioactive waste in a demonstration repository, it is not the intent of the Committee to mandate that any radioactive materials actually be placed in any demonstration repository. The decision to actually place radioactive materials in a demonstration repository is left to the discretion of the Secretary, and is to be made upon the basis that the benefits to be derived from such an action. These restrictions are intended to apply only if the Secretary decides that the placement of radioactive materials in a demonstration repository would be beneficial.

Subsection 3(c)(4) states that none of the activities under the program proceeding the excavation for shafts for demonstration repositories shall be considered to be a major federal action pursuant to section 102(2)(C) of the National Environmental Policy Act of 1969.

The excavations for shafts referred to in section 3(c)(4) are those which are conducted as part of the site characterization activities directed to be performed under subsection 3(b)(c)(A). As the site characterization activities precede the selection of a final site, they are preliminary to the formulation of a proposal for action, and thus would not require the issuance of an environmental impact statement under section 102(2)(c) of the National Environmental Policy Act. The intent of this section is merely to clarify that the designation of potential sites under section 3(b)(1) is a preliminary action and not a proposal for final action, and that the site characterization activities, up to the excavation for shafts, are simply information gathering actions preceding the formulation of a final proposal. However. the excavation for shafts during the course of the site characterization activities may have environmental consequences, in that the geologic structure would be disturbed, and significant quantities of rubble would be brought to the surface and would have to be managed in an environmentally acceptable manner. Because such excavations for shafts during site characterization activities may have environmental consequences, the Committee leaves the decision as to whether an environmental impact statement is appropriate at this time to the Department. However, the Committee wishes to make clear that this is a decision to be made by the Department in accordance with its guidelines, and that by designating the excavation of shafts as a demarcation point, it is not the intent of the Committee to thereby declare that such excavations require the issuance of an environmental impact statement.

Subsection 3(c)(5) prohibits the operation of any demonstration repository after the year 2000. The purpose of this provision is to further reinforce the objective that this is a demonstration pro-

gram at that, as such, it will terminate by a time certain. In selecting the year 2000 as the termination date for the operation of all demonstration repositories, it is not the Committee's intent to imply in any manner that any demonstration repositories are to continue in operation until that time. The Committee expects that any demonstration repositories will remain in operation only for the period of time needed to demonstrate the purpose for which the repository was established, and will expeditiously terminate operation upon the completion of the demonstration phase. The Committee is deeply concerned that the continued operation of demonstration repositories will serve as an inducement to delay the establishment of a full scale repository by providing the basis for arguing that any such full scale repository should await the completion of the demonstration program in order for all relevant information to be considered in the final site selection and design process.

Subsection 3(d) authorizes the Secretary to place in any demonstration repository canisters of solidified high level radioactive waste, which canisters are contained in engineered barriers, including overpacked canisters. Such barriers shall comply with applicable requirements of the Commission. The purpose is merely to allow the Secretary to conduct activities related to methods for disposing of solidified high level waste. The Committee anticipates that such waste will be placed in any full-scale repository and therefore recognizes the value of conducting such activities. However, in authorizing such activities, the Committee does not, in any way wish to imply that any demonstration repositories are to be designed on the basis that only solidified waste will be placed in a repository, or that engineered barriers are to be the ultimate method for isolating the high level waste from the biosphere. As stated previously, the Committee's position is that any demonstration or full scale repository is to be designed on the premise that the geologic media is to serve as the ultimate barrier separating the waste from the biosphere. Furthermore, the Committee wishes to stress that the Secretary's activities regarding engineered barriers are to comply with all the applicable guidelines of the Nuclear Regulatory Commission.

Subsection 3(e) directs the Secretary, within one year of enactment of this Act, to enter into an agreement with the Nuclear Regulatory Commission to establish arrangements for the Commission's review and consultation with the Secretary in regard to all aspects of the program. The agreement is to provide that the Secretary submit to the Commission, for its review and comment, a plan which will describe how the site characterization activities carried out under the program will not disturb the integrity of the geologic structure of the site where the activities are to be carried out. The arrangement is also to include a provision which requires that the Secretary submit to the Commission, for its review and comment, a plan which describes the form and manner in which high level radioactive waste will be placed in the demonstration repositories under the program. In preparing its comments on any plan, the Commission is directed to specifiy with precision its objections to any provision of the plan. The Secretary is directed to publish in the Federal Register notice that the plan has been submitted to the Commission and is available for public review and, upon receipt of the comments, the Secratary is directed to publish a notice of the

availability of the comments for public inspection. If the Secretary does not revise the plan to meet the objection specified in the comments of the Commission, the Secretary shall publish in the Federal Register a detailed statement of the reasons for not revising the plan. Under the agreement, the Secretary is directed to submit to the Commission safety analysis reports and such other information as the Commission may require to identify any danger to the public health and safety which may be presented by the program. The agreement is also to contain a provision wherein the Secretary is prohibited from undertaking any excavation of a site for a demonstration repository before receiving the approval of the Commission for such excavation. Under the agreement, the Secretary is directed to afford the Commission unrestricted access to the demonstration repositories to enable the Commission to monitor the repositories for the purpose of assuring the public health and safety.

The relationship between agencies and departments is always delicate, and therefore the Committee believes that it is mutually beneficial for the involved parties to enter into a formal agreement establishing the parameters of their relationship so that subsequent disputes can be avoided. The purpose of section 3(e) is to require the establishment of such an agreement for the purposes of this program, and to include in the legislati;on the essential features of any such agreement. The Committee believes that the establishment of this relationship is of such importance that it should be a statutory requirement. However, the Committee does not intend that the provisions of this bill encompass the entirety of the agreement, and recognizes that there are numerous other issues which should be included, and leaves to the Department and the Commission the responsibility for deciding what is appropriate. While the bill requires that the agreement be reached within one year of the date of enactment, it is the Committee's expectation that the Department and the Commission will give priority to defining their relationship and that the agreement will be executed as soon as it is practicable.

Because of the possibility that the Secretary's site characterization activities or construction activities may cause irreparable harm and compromise a site for possible use as a full-scale repository, subsection 3(e)(3) specifically requires that before initiating any excavation, either as part of a site characterization activity or as part of the construction of the demonstration repository, the Secretary obtain the concurrence of the Nuclear Regulatory Commission.

Subsection 3(f)(1) directs the Secretary, on a continuing basis, to consult and coordinate with the officials of each state in which the Secretary propose to construct a demonstration repository, respecting his plans for, and his construction of, any such repository. The Secretary is directed to notify the Governor of the state of his intention to locate a demonstration repository within the state. If there is no state law providing for the designation of an official to coordinate activities for the state with respect to repositories of radioactive waste, the Governor shall designate a state official to coordinate activities for the state with respect to any repository to be constructed under the program in such state.

The purpose of subsection 3(f)(1) is to impose upon the Secretary the responsibility for coordinating the activities of this program

with State officials. It is the Committee's expectation that this coordination will enable the State to be fully informed of the Secretary's intentions and afforded every opportunity to provide meaningful input and that the Secretary will make every effort to address and respond to State concerns. However, the Committee wishes to stress that the implementation of a radioactive waste disposal program is a national problem requiring Federal action, and, while the Secretary is to comply with all applicable State and Federal laws and regulations, no State is given the authority to veto or not occur in the location of the demonstration of the full-scale repository within its borders. Any informal or extra-legal agreement which has been entered into by a State and any official of the Federal government which vests that State with authority to veto or not concur in any manner in the location of the demonstration repository or full-scale repository within its borders is superseded by this subsection. Furthermore, nothing in this subsection is to be construed as granting to the Secretary or any other government official the authority to enter into any such agreement whereby any State could veto or not confer in the location of a demonstration or a full scale repository within its borders.

Under subsection 3(f)(2)(A), the Secretary is directed to hold public hearings in the vicinity of any site which is being considered for designation under section 3(b)(1) designated as a potential high level radioactive waste repository. Paragraph (2)(B) requires that before actually selecting a site under section 3(b)(4) for use as a demonstration repository, the Secretary hold public hearings for the purpose of informing the residents of the area in which the site is located of his intention to select the site for the construction of a demonstration repository and to receive their comments. The Committee expects that the Secretary will afford interested Members of the public every opportunity to participate in a meaningful manner at each stage of the process, and that such public hearings will provide a useful forum for addressing public concerns.

Subsection 3(g) requires that any demonstration facilities authorized by this section shall be constructed and operated as research, development and demonstration facilities pursuant to section 202 of the Energy Reorganization Act of 1974. Such facilities are to be constructed and operated in accordance with all applicable law. While the Committee recognizes that there is disagreement as to whether demonstration facilities would be licensed by the Nuclear Regulatory Commission under section 202 of the Energy Reorganization Act of 1974, it is not this Committee's intention to force a resolution of this issue within the context of this bill. Therefore, the purpose of subsection 3(g) is to merely require that any demonstration repository be constructed and operated pursuant to the requirements of section 202 of the Energy Reorganization Act, and leaves to the parties involved and inevitably the Courts the decision as to whether such facilities would be licensed by the Commission.

The Committee recognizes that, independent of section 202 of the Energy Reorganization Act, there are other laws, at both the State and Federal level, which would govern the construction and operation of any demonstration repository, and wishes to emphasize its intention that nothing in this bill would preclude the applicability of those laws. The Committee is aware that the applicability of cer-

tain laws would be dependent upon a determination of whether demonstration repositories are licensed by the Nuclear Regulatory Commission, and wishes to make clear that, in the event that these demonstration repositories are constructed and operated as unlicensed facilities, these laws would be operable.

Subsection 3(h) provides that if the Nuclear Regulatory Commission determines that any activity under the program (or omission of action) presents a danger to the public health and safety, it must issue an order directing the Secretary to cease such activity or take certain corrective actions. The order must be published in the Federal Register and notice of a public hearing on the order must be given. Upon the completion of the hearing, the Commission may affirm, revise, or rescind its order. The Secretary may not conduct any activity which is prohibited by an order of the Commission. The purpose of subsection 3(h) is to reaffirm the role of the Nuclear Regulatory Commission as the Federal Agency responsible for protecting the public health and safety from radioactive dangers and to vest it with the independent authority for so acting in regard to the actions of the Secretary in implementing the provisions of this bill. Clearly, any action which presents a danger to the public health and safety should be terminated, and the Committee believes that the Commission is that Federal agency which is most capable of exercising this responsibility. It is the Committee's intention that this authority be independent of any agreement between the Department and the Nuclear Regulatory Commission.

Subsection (i) authorizes to be appropriated to the Secretary for the purposes of carrying out the Act $102 million for the fiscal year ending September 30, 1981, and for subsequent years, such sums as may be authorized by legislation enacted after the date of enactment of this Act.

Subsection (j) authorizes the Secretary to enter into contracts under this section for any fiscal year only to such extent or in such amounts as are provided in advance by appropriation acts.

Subsection (k) requires the Secretary, in consultation with the Commission, to make annual reports to the Congress on the program. Each report is to include (1) a description of the activities undertaken and the costs incurred in the program within the period reported on, (2) the proposed activities to be undertaken and the costs proposed to be incurred in the program in the succeeding period, (3) a description of any problems encountered in the implementation of the program, (4) a description of the hearings held pursuant to the subsection (f)(1) and (2), (5) such separate views and recommendations as the Commission may include in the report, and (6) such other information as the Secretary determines appropriate.

Low-level radioactive waste study

Section 4(a)(1) authorizes the Secretary to conduct a study of the advantages and disadvantages of (A) using a glass furnace, or other appropriate device, to consume and reduce the volume of low level radioactive waste while at the same time appropriately containing such waste; (B) locating any such device at nuclear power plants to serve as processing facilities of low level radioactive waste generated in the regions in which the plants are located before the shipment of the waste for final disposal; (C) using existing underground

caverns produced by nuclear explosive detonations for disposing of low level radioactive waste; and (D) allowing short-lived, low level radioactive waste to be held in storage until safe for disposal as non-radioactive waste; and to submit a report by June 1, 1981, containing the findings, conclusions, and recommendations resulting from such study to the Speaker of the House of Representatives and the President pro tempore of the Senate. Subsection (b) authorizes $2 million to be appropriated to carry out this study.

Paragraph (c) states that the authority of the Secretary to enter into contracts under this section shall be effective for any fiscal year only to the extent or in such amounts as are provided in advance by appropriations acts.

Definitions

Section 5 defines the terms used in the Act. Under section 5(a)(1), the term "Secretary" means the Secretary of Energy. Under subsection 5(a)(2), the term "Commission" means the Nuclear Regulatory Commission. Under subsection 5(a)(3) the term "program" means the program authorized under section 3. Subsection 5(a)(4) defines the term "site characterization" to mean exploration and study both in the laboratory and in the field, undertaken to establish the geologic conditions of a particular site and include borings, surface excavations, excavations of exploratory shafts, and in situ testing, needed to determine the suitability of a site for a geologic repository, but does not include preliminary borings and geophysical testing needed to decide whether site characterization should be undertaken.

Under subsection 5(b)(1), for the purposes of this Act, the term "high level radioactive waste" means irradiated reactor fuel and the highly radioactive wastes resulting from the reprocessing of spent nuclear fuel. Such terms includes both liquid wastes which are produced directly in reprocessing, dry solid material derived from such liquid waste, and such other material as the Commission designates as high-level waste for purposes of protecting the public health and safety and for the purposes of this Act only, spent fuel.

Under subsection 5(b)(2), the term "transuranic waste" means material contaminated with elements which have an atomic number greater than 92, including neptunium, plutonium, americium and curium, which have a half life greater than five years, and which are in concentrations greater than 10 nanocuries per gram or in such other concentrations as the Commission may prescribe to protect the public health and saftey.

Paragraph (b)(3) defines the term "low-level radioactive waste" to mean radioactive waste not classified as high-level radioactive waste, transuranic waste, or byproduct material as defined in section 11e(2) of the atomic Energy Act of 1954.

Effect of Legislation on Inflation

In accordance with Rule XI, Clause 2(1)(4) of the Rules of the House of Representatives, this legislation is assessed to have minimal inflationary effect on prices and costs in the operation of the national economy.

Cost and Budget Data

The bill will authorize appropriations for Fiscal Year 1981 in the amount of $104,000,000 net in new obligational authority.

Pursuant to Rule XIII, Clause 7, and in accordance with the requirements of Section 252(b) of the Legislative Reorganization Act of 1970, the Committee estimates the costs to be incurred by the Federal Government during the current and five subsequent years as a result of enactment of this legislation as follows:

Fiscal year:	
1980	
1981	$79,000,000
1982	20,000,000
1983	5,400,000
1984	
1985	

The total estimated cost of the four demonstration repositories in current dollars is $1,400,000,000 over the period 1981 to 1990, pursuant to DOE preliminary estimates.

Cost Estimates and Comparison—Congressional Budget Act Information

The Congressional Budget Office (CBO) has provided the Committee the letter printed below pursuant to Section 403 of the Congressional Budget Act of 1974 (CBA). No information pursuant to Section 308(a) of the CBA has been provided to the Committee by the CBO because H.R. 7418 provides for new authorization rather than new budget authority.

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill number: H.R. 7418.
2. Bill title: Nuclear Waste Research, Development, and Demonstration Act of 1980.
3. Bill status: As ordered reported by the House Committee on Interstate and Foreign Commerce, August 26, 1980.
4. Bill purpose: The bill establishes a research program within the Department of Energy (DOE) for the development and demonstration of repositories to store high-level radioactive wastes. The bill directs DOE to undertake exploratory activities at four potential sites to determine their suitability as waste facilities and then to construct and operate demonstration repositories at selected sites. DOE is required to consult and coordinate with the governors of states in which proposed sites are to be located. The bill authorizes the Nuclear Regulatory Commission (NRC) to review DOE plans and safety reports and to order the termination of any DOE activity that threatens public health and safety. The bill authorizes the appropriation of $102 million for fiscal year 1981 for this program. An additional $2 million is authorized to the Department to conduct a low-level radioactive waste study.
5. Cost estimate:

[By fiscal years, in millions of dollars]

	1981	1982	1983	1984	1985
Authorization level	104				
Estimated outlays	79	20	5		

The costs of this bill fall within budget function 270.

6. Basis of estimate: For the purpose of this estimate, it is assumed that the full amounts authorized will be appropriated prior to the beginning of fiscal year 1981. Outlays are based on historic spending patterns for similar Department of Energy programs and on preliminary Department plans.

Based on information from NRC and DOE, it is estimated that the cost of the site characterization activities mandated by the bill could total between $200 million and $500 million, with about half the costs occurring between 1981 and 1985. The wide range results from uncertainty about how extensive the exploratory drilling and testing must be and what geologic media will be used.

Assuming a cost per project of about $200 million at 1980 price levels, it is estimated that a total of about $300 million will be required to construct the first high-level waste repository project by the end of 1986. The construction of all four demonstration projects mandated by the bill would cost about $1.4 billion between 1981 and 1990.

7. Estimate comparison: None.

8. Previous CBO estimate: On August 27, 1980, CBO transmitted a cost estimate for H.R. 7418, as ordered reported by the House Committee on Interior and Insular Affairs, August 22, 1980. That version of the bill only provides for the designation of waste repository sites and does not include an authorization of appropriations for demonstration facilities. On June 10, 1980, CBO transmitted a cost estimate for H.R. 7418, as ordered reported by the House Committee on Science and Technology. That version authorizes the appropriation of $102.4 million for 1981, compared to the $104 million authorized in the Commerce Committee version.

9. Estimate prepared by: Linda Alperin.

10. Estimate approved by: C. G. Nuckols, (for James L. Blum, Assistant Director, for Budget Analysis).

Committee Oversight Findings and Recommendations

No oversight findings and recommendations pursuant to Clause 2(1)(3)(A), Rules XI, under the authority of Rule X, Clause 2(B)(1) of the Rules of the House of Representatives are included, in addition to those comments and views contained elsewhere in this report.

COMMITTEE ON GOVERNMENT OPERATIONS

No findings or recommendations on oversight activity pursuant to Clause 2(B)(2), Rule X, and Clause 2(1)(3)(D) of Rule XI of the Rules of the House of Representatives have been submitted to this Committee by the Committee on Government Operations for inclusions in this report.

AGENCY VIEWS

At the time of the filing of this report, the Committee had received the following responses to its requests to the Nuclear Regulatory Commission and the Department of Energy with respect to the bill:

RESPONSES TO QUESTIONS IN THE JULY 9, 1980, LETTER FROM CONGRESSMAN JOHN DINGELL

By the Nuclear Regulatory Commission

Question 1. Should the high-level nuclear waste repositories which are owned by the Department of Energy be licensed by the Nuclear Regulatory Commission?

Answer. Yes, we believe that repositories for the permanent disposal of high-level waste (HLW) which will be owned and operated by the Department of Energy (DOE) should be licensed by the Nuclear Regulatory Commission in accordance with Sections 202(3) and 202(4) of the Energy Reorganization Act of 1974. In December 1979, NRC published a proposed rule (10 CFR Part 60) on the procedural aspects of licensing the disposal of high-level radioactive wastes in geologic respositories. This proposed rule provides for four stages of Commission review of DOE's activities in the licensing process: in an advisory capacity prior to site characterization and for a formal review of applications to construct the repository, receive waste, and close the facility. An Advance Notice of Proposed Rulemaking on the technical criteria for regulating geologic disposal of DOE high-level waste under 10 CFR Part 60 was published for public comment in the Federal Register on May 13, 1980.

Question 1(a). If so, at what point in the site selection, design or construction of a terminal repository should an application be submitted?

Answer. We believe that an application for construction authorization at a specific site should be submitted to the Commission only after DOE has substantially completed site characterization activities at several sites.

Question 1(b). What activities could be undertaken by the Department of Energy at a particular site before a license application is submitted; and specifically, should the Department be able to sink a repository shaft before submitting its license application?

Answer. NRC would encourage DOE to undertake such site characterization activities as are necessary for the Commission to make the findings, prior to construction authorization, referred to in proposed 10 CFR Section 60.31. A number of experts, including members of the U.S. Geological Survey staff, believe that exploration and testing at depth should be performed if sufficient data are to be obtained to determine whether a site is suitable for a repository and to make meaningful comparisons among alternative sites. In addition, both the Interagency Review Group on Nuclear Waste Management (IRG) and the recent National Academy of Sciences report, "Implementation of Long-Term Environmental Radiation Standards: The Issues of Verification" (Committee on Radioactive Waste Management, 1979), have suggested the desirability of geologic exploration at depth as part of the site characterization activi-

ties. We too expect that it will be necessary for the Department to sink an exploratory shaft with at least one horizontal drift and to perform *in situ* testing at the planned depth of waste emplacement prior to a major commitment to the site and before submitting its license application. We have encouraged such activities in the proposed licensing procedures.

Question 1(c). Under what circumstances, if any, would it be necessary to place radioactive material in a potential site in order to perform site characterization studies?

Answer. We have not as yet identified any circumstances where it would be necessary to place radioactive material in a potential site in order to obtain site characterization data in sufficient detail for use by the NRC in its licensing proceedings for a high-level waste geologic repository. However, we have not precluded such activities by our licensing procedures since there may be some value in obtaining data for performance of actual waste types and packages in contact with geologic environments actually being considered as potential repository sites. If such tests with actual radioactive wastes are conducted to obtain data for site characterization, the amounts of wastes should be limited to the minimum quantity needed to obtain the desired data and the waste should be retrievable.

Question 1(d). In establishing a full-scale repository, what are the advantages of constructing a small-scale or pilot repository; and if such a pilot facility is constructed, should it be licensed by the Nuclear Regulatory Commission?

Answer. In the IRG report one of the major conclusions was that a full sized repository should be developed in an incremental fashion. The increments might be site screening, site characterization at depth, pilot-scale testing, and finally construction and operation of the full-scale repository. At each stage more would be learned about the site and engineered features, and confidence would build at each step. The pilot facility operation might be continued throughout the operating life of the facility and beyond as a place where detailed tests can be performed and assessed over the long term. But it is our view that the critical stage in review occurs between characterization and construction, and that carrying out pilot operations at a possible repository without such review might lead to improvident expenditure of funds or might give rise to unwarranted pressures to license a project without fully satisfactory assurances of long-term performance. Therefore, if a stage of pilot operations is considered desirable it should be under an NRC license. The proposed regulations would permit, although they do not require, a pilot operation to be carried out pursuant to such a license. See proposed 10 CFR 60.41 *et seq.* These views are consistent with the IRG report, which explained the importance of licensing of "intermediate storage facilities," but which would allow "R&D facilities" ("where no more than some tins of spent fuel waste assemblies or waste canisters would be emplaced for a limited test period and then removed") to be built and operated without licensing. IRG report, pp. 54–65.

Question 2. What is the present status of the Nuclear Regulatory Commission's efforts to promulgate the regulations which must be issued in order to select a high-level nuclear waste terminal repository site?

Answer. To implement its authority over high-level radioactive waste (HLW) and to provide guidance to the states, DOE, the industry, and the public, the NRC is at this time developing new regulations for HLW disposal in geologic repositories. The development of the regulation for the management of high-level radioactive wastes is well along, and is being promulgated in two parts:

1. *10 CFR Part 60—Procedural Rule.*—Published (44 FR 70408) on December 6, 1979, as a Proposed Rule for public review and comment, this portion of the rule describes the procedures that must be followed in preparing and submitting an application for authorization to construct and operate a facility for disposal of HLW. The comment period ended on March 3, 1980. The staff is currently evaluating the comments received and preparing this portion of the regulation for promulgation in final form.

2. *10 CFR Part 60—Technical Rule.*—Published (45 FR 31293) on May 13, 1980, as an Advanced Notice of Proposed Rulemaking (ANPR), this draft portion of the rule identifies the performance objectives and other technical criteria that a license application will be measured against. The ANPR informs the public of the status of our efforts to develop technical criteria and invites their comments on our approach and on the technical considerations presented. The comment period ended on July 14, 1980. The staff is currently reviewing and responding to the comments and is preparing a Proposed Rule.

Question 2(a). Please identify what regulatory actions must be taken, when such actions are expected to be taken, and what variable would affect such actions.

Answer. The goal of the national nuclear waste management program is to isolate from the biosphere all types of existing and future nuclear wastes from military and civilian activities, including spent fuel and high-level radioactive wastes, so as to pose no significant threat to public health and safety and the environment.

The overall performance objective for disposal of radioactive wastes (i.e., "establishing generally applicable environmental standards for the protection of the general environment from radioactive material," pursuant to Reorganization Plan Number 3 of 1970) will be established by the Environmental Protection Agency (EPA) in their Environmental Radiation Protection Standards which are scheduled to be published for public review and comment during 1980.

The NRC is responsible for providing and implementing the framework of regulations and criteria that will ensure that disposal in a high-level waste repository is consistent with the achievement of this performance objective. The regulatory actions associated with developing the NRC regulation for disposal of high-level radioactive waste in geologic repositories, with current schedules, are presented below:

1. *10 CFR Part 60—Procedural Rule.*—The staff will complete preparation of this portion of the regulation in final form and submit it to the Commission by September 30, 1980, for review. A favorable review by the Commission will result in promulgation of the effective Procedural Rule by the end of 1980.

2. *10 CFR Part 60—Technical Rule.*—The staff will complete preparation of this portion of the regulation as a Proposed Rule for submittal to the Commission by September 30, 1980, for review and

comment. A favorable review will result in the promulgation of the Proposed Technical Rule for public review and comment by the end of 1980. The staff hopes to have an accompanying Draft Environmental Impact Statement prepared for public comment at the same time. The staff will respond to comments received and develop the final technical rule around mid-1981 for review of the Commission or for submittal to a hearing board if public hearings are determined to be desirable. This submittal or review may be as late as the end of 1981 if the comments received are extensive. If public hearings are not held, a favorable review by the Commission will result in promulgation of the final Technical Rule by December, 1981. If hearings are held, this may be delayed until December, 1982.

Question 3. Given the Commission's present knowledge, what geologic media are considered as most promising for disposing of high-level nuclear wastes?

Answer. Neither the Commission nor the staff has determined what geologic media are the most promising for disposing of high-level nuclear wastes. It is for this reason that the proposed high-level waste regulation encourages DOE to undertake site screening and site characterization studies at depth in several different media.

Question 3(a). Please identify those geologic media which appear to be more preferable and briefly identify what actions need to be taken with respect to each in order to determine their suitability for regulatory purposes.

Answer. The Commission has not identified geologic media which appear to be more preferable. Actions that need to be taken by DOE to determine the suitability of a site for regulatory purposes are set forth in the proposed procedural portion of 10 CFR Part 60. They include submitting site screening plans and site characterization reports and having NRC licensing staff observe the site characterization activities.

The NRC high-level waste technical program is developing goals and requirements for geologic repository performance and not engineering design or specific geologic medium requirements. As we see it, DOE is responsible for developing waste disposal technology, and NRC is responsible for licensing review. We are very conscious of maintaining the distinction between NRC's program and DOE's program. Therefore, the developing technical regulation (10 CFR 60) is not requiring that the geology be granite or salt or the waste form be glass or ceramic or spent fuel, nor does it specify thermal or structural loadings, etc. The intent is to allow flexibility to DOE to determine geology and designs which will meet the performance requirements. We intend to be in a position to review DOE's designs, waste forms and geology, and to consider alternatives to the extent contemplated by NEPA. The draft technical criteria were published in the Federal Register (4 FR 31393) on May 13, 1980.

It is the responsibility of the DOE to make the determination as to the suitability of a specific site in a given medium for use as a high-level geologic repository site. NRC's responsibility is to develop a performance assessment capability in order to assure that there is no unreasonable risk to the health and safety of the public if a repository of a given design is operated at a specific site in a

given medium and to give proper consideration to environmental values in accordance with NEPA.

Question 3(b). In determining the suitability of a particular geologic media for regulatory purposes, how much research will be conducted by the Nuclear Regulatory Commission using funds directly appropriated to the Commission, and how much will the Commission rely upon the work performed by the Department of Energy using funds authorized and appropriated to that Department for such purposes?

Answer. The NRC staff have taken the position that the Department of Energy must develop all of the information needed to determine the suitability of a particular geologic media. NRC will develop the capability to independently assess the validity of the DOE developed data, the data collection methods, and the acceptability of the site in discharging its statutory responsibility for protecting the public health and safety and the environment.

The NRC is budgeting the following resources for these activities:

Fiscal year	SY	Thousands
1981	24.1	$7,200
1982	30.8	13,449
1983	32.0	16,724
1984	33.4	18,244

Question 4. What are the Commission's specific comments on:

Question 4(a). The schedule established in (i) section 202 of H.R. 6390 and (ii) section 3 of H.R. 7418?

Answer.

Section 202 of H.R. 6390

(a) DOE is to recommend to Congress at least four potential repository sites which are considered suitable for development as licensed commercial repositories. Recommendations for two sites are to be submitted to Congress by December 1, 1981; and recommendations for two additional sites shall be made by December 1, 1983.

Comment. These dates appear to be achievable based upon the schedule provided the Commission by DOE in the Waste Confidence Rulemaking (April 15, 1980, submittal).

(b) Not later than February 15, 1981, DOE is required, in consultation with EPA, NRC and the USGS, to issue guidelines for the elimination of sites from consideration for use as permanent repositories for the disposal of HLW.

Comment. The Commission believes this deadline to be achievable.

(c) Not later than March 30, 1988, DOE shall submit to the President for his review a recommendation of the site which the Secretary considers most qualified for application for license as a permanent repository.

Comment. This date appears to be achievable with the schedule provided to the Commission by DOE in the Waste Confidence Rulemaking (April 15, 1980, submittal).

Section 3 of H.R. 7418

(1) DOE is to identify the location of the first two sites for demonstration repositories by the end of the first quarter of fiscal year 1981 and the third and fourth sites by the end of fiscal year 1983.

Comment. Based on the information provided by DOE in its April 15, 1980 submission to the NRC Waste Confidence Rulemaking Proceeding (44 FR 61372), DOE probably could identify the location of these four sites in the time specified. This would not include the time to prepare environmental impact statements, if required, by the National Environmental Policy Act (NEPA).

(2) DOE shall have the first demonstration repository in operation by the end of fiscal year 1986 and the second by the end of fiscal year 1987. The third and fourth repositories are anticipated to be in operation by the end of fiscal year 1990.

Comment. The time required to have these demonstration repositories in operation appear exceedingly short if careful geologic site characterization activities are to be undertaken at all four sites particularly if due allowance is made for consultation and coordination with the appropriate state officials.

Question 4(b). State review boards established in section 203 of H.R. 6390?

Answer. In NUREG-0539, NRC noted a difference between an independent technical review by the states, which would be fully consistent with improvement of the NRC licensing process and an independent administrative review, which was characterized as "less relevant to the federal licensing decision"; the latter, according to the report, "might therefore be left to proceed, if at all, using State resources."

We continue to believe that this is a useful distinction. In our judgment, the responsibility for adjudicating contested issues should be focused. One federal agency, the NRC, should have the responsibility to hold hearings and make legal determinations on the record. After this process has been completed, additional reviews by Congress or the President, with state participation as appropriate, could be employed to ensure that the Commission's decision serves the national interest. We believe that such a Presidential/Congressional review should come only at the construction authorization stage. This would mean that it would be late enough in the development process to be based on meaningful information but early enough so that large expenditures of resources will not have been committed by the federal government. The Commission believes that, as the responsible federal regulatory agency, the NRC should be allowed to carry out independent regulatory proceedings. Thus, while states should have the same opportunity for participating in those proceedings as any other party, a formal state objection should be allowed only after the full record of the construction authorization hearing has been established.

We have supported grants to support independent technical reviews, and we reaffirm this support. But we believe that the support should be extended to agencies created as the individual states determine and with a view to improving, rather than duplicating or overlapping, the NRC regulatory process.

Question 4(c). The geographic distribution in site selection requirements of section 3(1) of H.R. 7418?

Answer. We believe that geographic distribution in site selection would be desirable, if found to be feasible. However, site selection should clearly emphasize the attributes of containing the radioactive wastes rather than geographic distribution.

Question 4(d). The canister specifications contained in section 3(2) of H.R. 7418?

Answer. From our assessment of canisters and other engineered barriers, the specification looks reasonable. We do not believe, however, that such engineering detail should be covered in statute.

Question 4(e). The solidification requirements in section 3(3) of H.R. 7418?

Answer. The solidification requirements in section 3(3) of H.R. 7418 appear reasonable. We do not believe, however, that such requirement details should be covered in statute.

RESPONSES FROM THE DEPARTMENT OF ENERGY TO QUESTIONS RAISED BY THE CHAIRMAN OF THE HOUSE SUBCOMMITTEE ON ENERGY AND POWER

Question 1. Please provide a table showing the Department's present schedule for establishing a terminal high-level nuclear waste repository and provide an explanation for the basis of this schedule.

Answer. The Statement of Position of the U.S. Department of Energy in the matter of the Nuclear Regulatory Commission's proposed Rulemaking on the Storage and Disposal of Nuclear Waste (DOE/NE-0007) provides a very comprehensive discussion of the present repository schedule. In summary, the schedule is as follows for the case in which at-depth exploration and testing is not required to qualify multiple sites prior to selecting a preferred site for application for NRC licensing: Los Medanos,[1] August 1982; Nanford Site, March 1984; Salt Dome, September 1983; Bedded Salt, April 1985; Nevada Test Site, June 1985; and Crystalline Rock, December 1985.

DOE issues Site Recommendation Report (SRR) and Draft EIS—December 1985.

DOE issues Site Selection Report (SRR)—1987.

DOE submits license application to NRC—1987.

NRC issues construction authorization—1991.

Repository startup—salt—1997, hard rock—2000.

If construction of a shaft for exploration at-depth were required before submission of a licensing application, the start of design and construction would be delayed about 40 months. However, the duration of full-scale repository construction would not be significantly affected as multiple shaft excavations are presently planned.

The formal site selection process can be initiated after four to five sites have been found suitable and have been banked. A six-month period, following the banking of the latest candidate sites, is allowed for preparation of the Site Recommendation Report (SRR), which will provide a comprehensive comparison of the candidate sites. Following reviews of the SRR by appropriate Federal and State agencies and the public, the Site Selection Report (SRR) will be issued. A four-year licensing review by NRC on the construction

[1] This date is based only on the process which would investigate and qualify the Los Medanos site as part of the President's commercial waste management program.

license application has been used in the reference schedule since NRC staff have stated that this period of time will be required. The schedule for construction of the repository is based on construction experience of nuclear receiving facilities and mine/shaft development projects in the U.S. The longer construction time for a repository in media other than salt reflects the increased difficulty in mining and structural support requirements for non-salt media. More details on the basis of the schedule can be found in DOE/NE-0007.

Question 2. Please provide a chart indicating the regulatory requirements which must be complied with at each stage in the present schedule and identify which regulatory requirements (i) are already in place, and (ii) have not been issued in final form. For those which are not in final form, please supply the present status of such regulatory activity.

Answer. None of the regulatory requirements for a high-level nuclear waste repository have been issued in final form. EPA is currently formulating a proposed standard and plans to issue it for public review and comment in the near future. NRC issued proposed licensing procedures for public comment on December 6, 1979, and issued proposed technical criteria on May 13, 1980. NRC proposed rules and DOE comments on them have been forwarded to the Subcommittee under separate cover.

Although the detailed requirements for a high-level waste repository have not been specified, a consensus among DOE, EPA, and NRC as to the general requirements is developing even though specific detailed issues are still the subject of discussion. There is general agreement, for example, that States and NRC should be involved as early as possible in the selection of suitable sites, that several sites should be characterized in different geologic media before selecting one, that licensing should be done in a phased manner; i.e., separate decisions to construct the repository, begin emplacing waste, begin backfilling, and finally to decommission the facility. There is also general agreement on the board technical issues. For example, all agree that retrievability of wastes should be assured for some initial time after emplacement, that the waste package emplaced in the repository be capable of containing the wastes over the period when radiation and thermal output are dominated by fission product decay, and that deposits of important natural resources should be avoided in siting.

EPA plans to issue their draft standard for comment shortly. After a comment period and document revision, which we expect will take 12 to 28 months, EPA will promulgate their standard in final form.

We expect NRC to issue their procedural requirements in final form in the fall of 1980. Their technical criteria we expect to be issued again for comment in late 1980 and in final form in late 1981.

Question 3. What is the present projected cost of establishing a terminal high-level nuclear waste repository? Identify the variables which would affect this cost.

Answer. In the Department of Energy's Statement of Position in the matter of the Nuclear Regulatory Commission's Proposed Rulemaking on the Storage and Disposal of Nuclear Waste, representative repository costs were presented for four different emplacement

media: dome salt, bedded salt, basalt, and granite. The following table from that document, which is based on spent fuel as the reference waste form, provides the estimated repository costs for the various geologic media listed. If one assumes the same repository acreage as noted in the table, the repository costs for high-level waste (HLW) resulting from reprocessing spent fuel would be comparable except for the operating costs. The operating costs would be greater because the lower heat output for HLW would permit more canisters to be placed in the repository. The disposition of the other waste components of reprocessing is not considered in this analysis.

ESTIMATED REPOSITORY COSTS FOR VARIOUS GEOLOGIC MEDIA [1]

[All costs in 1980 dollars, unescalated, undiscounted]

	Standardized repository			
	Dome salt	Bedded salt	Basalt	Granite
COST ITEM				
Design and construction (million dollars)	1,210	950	930	920
Replacement capital equipment (million dollars)	50	50	100	100
Operating cost fixed (million dollars)	140	130	250	250
Operating cost variable (million dollars)	960	890	1,710	1,700
Operating cost total (million dollars)	1,100	1,020	1,960	1,950
Decommissioning cost (million dollars)	130	150	160	160
Total (million dollars)	2,490	2,170	3,150	3,130
CHARACTERISTICS				
Heat loading kW/acre (design)	40	40	40	40
Canisters of spent fuel stored	160,000	160,000	160,000	160,000
MTU stored	68,000	68,000	68,000	68,000
Repository area (acres)	2,000	2,000	2,000	2,000
MTU/acre	34	34	34	34
Canisters/acre	80	80	80	80
Years of operation	14.9	14.9	14.9	14.9
Undiscounted unit cost (dollars/kg)	36.60	31.90	46.30	46.00

[1] Reference—DOE/NE-0007, table III-3, Pg. III-75

In regard to variables which would affect repository costs, choice of emplacement media, thermal loading limits, and repository underground size have the greatest impact. In the above table, the higher cost for basalt and granite is due to the greater difficulty of excavation in a hard rock media compared to the softer salt. This results in much higher operating costs over the projected years of operation. For thermal loading limits, the impact is on the total operating cost over the repository lifetime. As the thermal loading is lowered the quantity of waste can be emplaced is reduced and the operating period is correspondingly reduced. Finally, repository underground size affects the repository costs because of the efficiencies involved with mining larger areas.

Question 4. What geologic media are presently being studied as potential hosts for nuclear wastes, and what is the present status of such studies?

Answer. Currently, the Department is investigating a number of potential host geologic formations as candidate nuclear waste re-

positories. The most advanced of these studies are in the salt dome formations in the Gulf Interior Regions encompassing Louisiana, Mississippi and East Texas. In these States, DOE has conducted actual field activities among seven salt domes. Assuming positive study results, one or more of these salt domes could be qualified for site selection by September 1983.

Formations of bedded salt throughout the United States are also being evaluated by the Department of Energy, and a site could be qualified for selection by April 1985. Deposits of bedded salt have been under active field investigation in the Palo Duro Sub-basin in the Panhandle area of North Texas and in the Paradox Basin of Southeastern Utah. The Salina Salt Basin encompassing parts of Michigan, Ohio, and New York appears to have areas that may be geologically favorable as a repository environment; but no field investigations have been carried out by the Department and much additional information is needed before a repository site could be identified in the Salina Basin. In addition, the Los Medanos site near Carlsbad, New Mexico, has been intensively investigated in connection with the proposed Waste Isolation Pilot Plant Project. This project was authorized by Congress research and development facility to demonstrate the safe disposal of radioactivity resulting from defense activities and programs.

Two projects are actively pursuing the possibility of containing nuclear waste in repositories located on Department-owned land. Geologic and hydrologic investigations have been underway in basalt at the DOE Hanford site in Washington since 1977. Current data and understanding indicate that basalt is a suitable medium for the disposal of radioactive waste.

Of the nine possible site locations at Hanford, a seventy square mile area in the Cold Creek Syncline appears to have high potential for being acceptable. Site qualification is expected by March 1984.

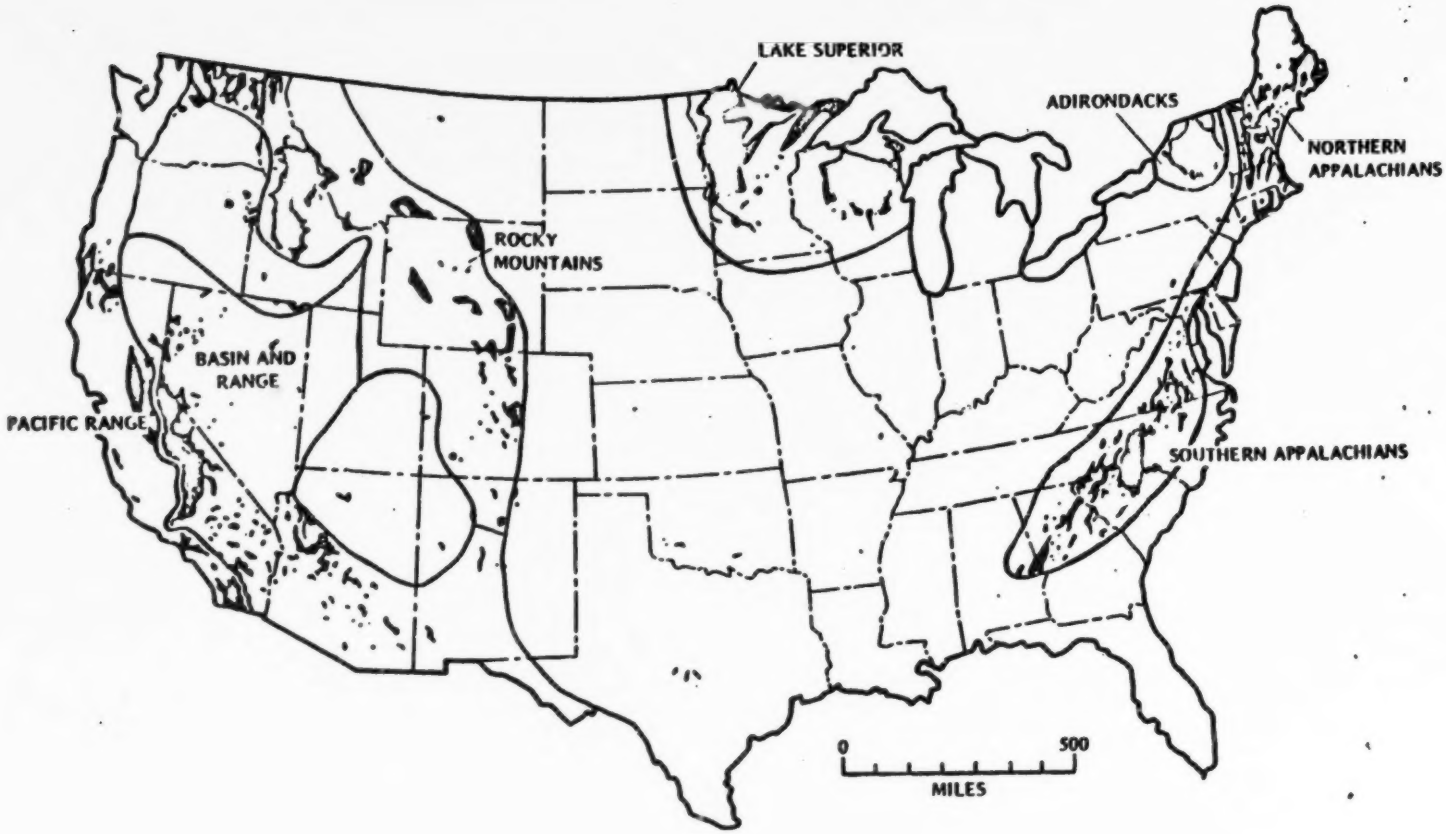
The Nevada Test Site (NTS) contains a complex geology. Repository site exploration efforts involve the southwestern part of NTS and are directed at the Yucca Mountain volcanic tuff formation. Current work, including field and geologic studies, is concerned with identifying structural features that affect the distribution of past volcanic activity. Potentially a site could be qualified for selection at NTS for June 1985.

Recently, the Department has held meetings with officials of Wisconsin, Michigan and Minnesota to discuss expanding the site selection process into crystalline hard rock formations in those States. This is in concert with the President's February 12, 1980, message to Congress calling for the DOE to expand and diversify the program on a National scale to look at a number of differing geologic media in support of repository siting. These new studies will include a review of existing literature on a regional basis that would ultimately lead to more detailed investigations of areas of interest. The Department estimates that a site could be identified in a hard rock medium by December 1985.

Question 5. Please provide a map identifying the location of geologic formations which are presently under consideration as sites for potential high-level nuclear waste repositories.

Answer. Two maps have been provided. The first, "Salt Regions and Federal Reservations Considered for Terminal Storage of Radioactive Waste," is self-explanatory. The second, "Major Regions of Granitic Formations," displays all major crystalline rock formations within the United States. At this time, only the States of Michigan, Wisconsin and Minnesota have been contacted to seek State cooperation in regional studies of the southern extension of the Canadian Shield.

SALT REGIONS AND FEDERAL RESERVATIONS CONSIDERED
FOR TERMINAL STORAGE OF RADIOACTIVE WASTE



MAJOR REGIONS OF GRANITIC FORMATIONS

Question 6. How many repositories should be constructed within the next 25 years, and on what assumptions and variables is this estimate based?

Answer. The number of respositories that will be required will depend upon the future use of nuclear power and on the geologic media in which each repository would be located. Because of restrictions of radioactive waste heat loading on the host rock and other structural considerations, different spacing of waste canisters would be required and results in different repository waste capacities for a given rock type and repository area. The number of repositories that will be constructed initially is also dependent upon the extent to which the regional repository approach is implemented.

We can conceive of perhaps two to three repositories being constructed within the next twenty-five years, based on the above considerations. This number would most likely be sufficient for the nuclear power growth envisioned for that period of time.

Question. 7. Please provide a brief description of the various forms which could be used in preparing high-level nuclear waste for placement in a terminal repository and a brief discussion of the advantages and disadvantages of each, together with an explanation of the present status of the technological knowledge of each, and a justification for selecting the form which is presently preferred.

Answer. The DOE waste management program is currently being conducted so that whatever form is declared to be high-level waste can be properly disposed of in geologic repositories. Due to the indefinite deferral of reprocessing, the possibility exists that spent fuel may at some time in the future be considered high-level waste, although it is not currently so classified. Our strategy is focused on the use of mined geologic repositories capable of accepting both waste from reprocessing and unreprocessed commercial spent fuel.

In the case of spent fuel, the uranium oxide and fission product oxide form is relatively non-leachable. Therefore, the Department's program on spent fuel is primarily considering methods to package spent fuel. Methods include disassembly for packaging and packaging of the spent fuel without disassembly. Metallic and non-metallic filler materials would be placed within a canister containing several (1–3) fuel assemblies. The sealed canister would be packaged further by adding engineered barriers of metallic and non-metallic materials to provide protection during the time that fission product content dominates the hazard.

Spent fuel has been packaged and emplaced in storage in the Climax granite mine on the Nevada Test Site. Prototype designs are currently being developed for future demonstrations. The materials requirements for canisters and engineered barriers are similar for spent fuel and solidified high-level waste. Accordingly, the development program covers both requirements. Development of high-level waste forms is also proceeding.

In the case of solidified high-level waste as a byproduct of reprocessing, the waste forms currently being considered for preparing high-level nuclear waste for emplacement in a terminal repository include standard concretes, hot-pressed and low-leaching concretes, stabilized calcines, borosilicate glass, high-silica and high-alumina glasses, glass ceramics, crystalline ceramics, such as Supercalcine

and Synroc, matrix forms such as glass pellets in a metal matrix, cermets, and multibarrier forms such as coated particles in a metal matrix. All of these forms would be further packaged in high-integrity, long-lived canisters with protective metal overpacks before emplacement in the repository. There would also be an additional engineered barrier by backfilling with materials like bentonite. Of these forms, only concrete and borosilicate glass are currently developed to the point of engineering evaluation for repository emplacement, but an aggressive research program is being pursued on all the other forms listed. This research places special emphasis on forms such as high-silica glass, crystalline ceramics, and coated particles in a metal matrix which have the potential of achieving better properties than the current borosilicate glass reference forms. Development efforts on certain of the technically least promising forms are scheduled to be eliminated from the program before fiscal year 1981.

Borosilicate glass has been selected as the currently preferred high-level waste form by essentially every Nation now producing or planning to produce nuclear waste because:

In combination with a suitable canister and overpack it is judged capable of meeting radionuclide release criteria which have been placed against the waste forms in a National regulatory framework.

It can accommodate a wide variety of waste compositions.

Technology for borosilicate glass waste form production is well developed and is already in routine commercial use in France.

Borosilicate glass has better properties than concrete waste forms at little or no premium in production cost and appears to be both simpler to prepare and less expensive than any of the other high quality forms.

The following listing briefly describes the primary high-level waste forms together with their advantages and disadvantages.

Concrete

Concrete waste forms are produced by mixing waste with water, cement, and other additives for retention of specific radionuclides and casting into monoliths by conventional techniques. Concrete waste forms have the following advantages:

Actinide leachabilities as low as glass.

Adequate compressive strength.

Good thermal stability up to 400 C.

Strength and leachability unaffected by radiation.

Disadvantages are:

Cesium and strontium leachabilities one or two orders of magnitude poorer than glass.

Potential for radiolytic gassing.

Potential for rapid setting.

Potential for steam disruption at temperatures above 400 C.

Low tensile strength.

Properties more sensitive to waste composition variations than glass.

Borosilicate glass

Production of a borosilicate glass waste form involves blending of the glassmaking chemicals containing about 50 percent silica with radioactive waste and melting them together.

The advantages of borosilicate glass as a waste form are:

Very low leachability at temperatures below 100 C.
Very low volatility.
High resistance to radiation damage.
Relatively insensitive to compositional variations in the waste.

Disadvantages are:

Reacts with high-temperature water and brine.
Devitrifies with a small increase in leachability.

Polycrystalline ceramics

The concept inherent to this class of waste forms is the partitioning of radionuclides into specific crystal phases as a constituent of the host crystal structure or contained in solid solution within the host lattice. The phases of primary interest in this system are titanate-based, such as perovskite, zerconolite, hollandite; high-alumina phases such as corundum, spinel, nepheline, or fluorite structures, and high silicates or phosphates such as monazite or pollucite. Ideally, when appropriate additions of CaO, TiO_2, BaO, SrO_2, Al_2O_3, etc., are mixed intimately with a specific waste formulation, and is densified at elevated temperatures, a phase assemplage develops such that each radionuclide is incorporated into its most stable host lattice. The dense ceramic resulting from such a product should have leaching characteristics limited only by the inherently low solubility of the crystal phases within the ceramics.

Advantages:

Potential for excellent leach resistance up to very high temperature.
High waste loadings.
Potential for high thermal stability.
High density.

Disadvantages:

Radiation stability and leach resistance not demonstrated.
Complex process.
Tolerance to varying waste composition not demonstrated.
Quality assurance may be difficult (difficult to verify production of desired crystalline phases).

Porous glass matrix

The porous glass matrix (PGM) waste form involved the encapsulation of radionuclides within a high-silica glass matrix. The very high temperatures, 1,800° C, normally required to process vitreous silica are circumvented by use of microporous glass particles. Leaching the soluble soda-borate phase from a soda borosilicate glass leaves a microporous network of high surface area. The microporosity can trap volatile species or liquid waste during processing and enclose them within the solid when the pores collapse on subsequent heating. Sintering and densification of the high-silica glass particles can occur at temperatures of 1,100° C encapsulating solid waste particles within the sintered matrix. A multibarrier aspect of the process is to contain the mixture of porous parti-

cles and waste in a fused silica-like tube and collapse the tube at elevated temperature to produce a nonradioactive sheath of fused silica around the waste. If no cracks develop, such a form would have zero release until the fused silica casing was breached.

Advantages:

Potential for leach rates lower than borosilicate glass.
Potential for better containment of volatile gases.
Potential for better long-term stability than borosilicate glass.

Disadvantages:

Matching of thermal expansion coefficients of core and tube may be difficult.
Uncertainty in uniform collapsing of large tube.
Several remote processing steps required.
Limited to batch-type operation.

Multibarrier forms

The three main categories of multibarrier forms under investigation are:

Borosilicate glass marbles in a matrix of glass or metal.
Crystalline ceramics in a metal matrix.
Borosilicate glass marbles or crystalline ceramic pellets coated with carbon or alumina.

Advantages:

Very high leach resistance, particularly for coated marbles or pellets.
Excellent heat transfer.
High impact resistance.
Easier quality control on marbles and pellets.

Disadvantages:

Low waste loadings.
Potential for casting or coating voids.
Metal matrices susceptible to corrosion and melting.
High surface area of actual waste particles.
Complex processes involved.
Difficult to assure uniform pellet or marble dispersal in matrix.

Question 8. What is the projected role of the States in the selection of the potential high-level nuclear waste repository site and in the selection of a technology for disposing of such wastes at a particular site?

Answer. The Department of Energy is committed to actively involving the States in the decisionmaking process that would lead to the location of a high-level nuclear waste repository. The Department has sought to establish a system of consultation and concurrence with States in which exploratory studies need to be undertaken. Similarly, the Department would assure the protection of public health and safety in States surrounding potential host States by also making provisions for them to participate in the review process. The degree of involvement of the surrounding States would probably vary depending on the specific site location.

Some affected States have already established agencies and commissions to coordinate and review DOE activities within their boundaries. Memoranda of Understanding have also been recommended or developed to help formalize the consultation and con-

currence process between the Department and potential host States. State bodies have been funded by the DOE to conduct independent evaluations of DOE investigations in their States. In some cases, State academic institutions have conducted the primary geologic, hydrologic, and socioeconomic research. Significant progress in this area has, therefore, been achieved. Periodic reviews, with State participation in the definition of continuing phases of work, would occur when new data and information could support meaningful discourse or generally as often as a particular State may wish. It is not possible to anticipate in advance all the possible grounds which could give rise to a State's participation in the consultation and concurrence process. They may be technical, institutional, economic, or socio-political. As indicated, the DOE would fund independent expertise to provide this kind of meaningful review and input to the Federal program.

Waste disposal technology is being developed in concert with DOE repository siting activities. A multiple barrier approach consisting of engineering and natural media would provide a complementary total system to prevent migration of nuclear material back to man's environment. The consultation and concurrence process would extend to this technology since it is relevant to site evaluation. The States would also have the opportunity to comment on site selection and waste disposal technologies as part of the licensing process.

Finally, the inputs from the State Planning Council will play a very significant contributing role in defining the specifics of Federal/State interactions.

Question 9. Should the State have a veto over the selection of a site within its boundaries or over the selection of the design or construction of a particular high-level nuclear waste repository?

Answer. Preferably, the process of consultation and concurrence would be implemented in the earliest phases of the siting studies and would continue through decommissioning. The goal of the Administration is to provide a stable environment for decisionmaking that is sensitive to the concerns of the States. This process would, therefore, develop and instill an environment of cooperation between the Federal Government and the affected States that would avoid either formal State veto, on the one hand, or Federal fiat, on the other. In an instance where a State objects in a way that is completely unresolvable, and in such a way which would prevent the Federal Government from fulfilling its responsibilities, the Federal Government would still need to find a way to build a repository. We are working on this issue with the help of the State Planning Council to determine a recommended course of action.

Question 10. Should high-level nuclear waste repositories which are owned by the Department of Energy be licensed by the Nuclear Regulatory Commission and, if so, at what point in the present schedule should the license application be submitted?

Answer. DOE supports the licensing of repositories for high-level waste by NRC. We believe an independent review of the proposed facilities and an independent assessment of their safety will provide greater assurance to the public that the facilities will meet the objectives set forth for them. Public confidence in the siting and design will, we believe, be greater and public confidence in the facility enhanced.

DOE proposed to prepare Site Characterization Plans for each potential site, a Preliminary Safety Analysis Report (application for construction authorization) and Environmental Report in September of 1987, and a Final Safey Analysis Report (application for operation, i.e., to begin emplacing waste) in July of 1993.

Question 11. In establishing a full-scale high-level nuclear waste repository, what are the advantages of constructing a small-scale or pilot repository, and if such a pilot facility is constructed, should it be licensed by the Nuclear Regulatory Commission?

Answer. If a pilot facility is defined as one in which a small number of packages are placed, such as proposed in H.R. 7418, we do not believe that there are many advantages from a strictly technical point of view although such a facility would serve as a demonstration. If on the other hand, reference is made to test facilities in which tests are conducted in a mine which generically is representative of the candidate host rock, we believe significant technical results can be obtained through intensive instrumentation of the tests. In such test facilities, non-radioactive tests with heaters are coupled with specific tests using a few (up to 10) canisters of spent fuel and/or high-level waste. These tests provide all of the technical demonstration now considered necessary for the design of repositories. The test are not required to characterize a specific site. If the facilities are for R&D purposes, licensing by NRC is not required.

Either type of facility could provide some advantages: (1) experience is obtained by DOE and NRC as procedures are selected and used; (2) some verification of the technical bases is obtained if both heaters and waste are used to represent conditions of an actual repository; and, (3) additional evidence is obtained that spent fuel and/or high-level waste can be emplaced and retrieved. Either method of testing should not be done at candidate sites because it could be viewed as compromising the structure of the site before NRC has been involved in licensing proceedings.

We believe that the use of test facilities, such as the Salt Test Facility proposed in our fiscal year 1981 budget request and our planned hard rock facility, to be budgeted in future years, will adequately provide all of the testing that is needed prior to the existence of an actual repository. Any remaining uncertainty can be compensated for by observations from carefully instrumented sections of the repository during startup of the licensed repository.

Question 12. Under what circumstances, if any, would it be necessary to place radioactive materials in a potential site in order to perform site characterization studies?

Answer. Our data to date indicate that it is not necessary to place radioactive waste at a site in order to perform site characterization studies. The data show that radiation effects on the host rock are minor and certainly do not influence the choice of a site. We believe it is important to verify the laboratory data on radiation by field tests. The field tests will also be used to verify the absence of unplanned effects due to the interaction of the host rock and the waste package. The first field test to evaluate effects on granite is now underway in the Climax mine at the Nevada Test Site. Also, we are studying tracer techniques to determine if they can be used to verify the calculated values for retention of radionuclides. If currently planned tests are successful, it may be desirable

to confirm laboratory results by on-site testing of the radionuclide retention capability of the geologic media. We do not, however, see any of the above tests as a requirement for characterization of a site before the start of licensing procedures. The tests are a further means of verifying facts and thereby confirm our proposed design calculations.

Question 13. At what stage in the site selection process does the Department intend to comply with the requirements of section 202(ii)(C) of the National Environmental Policy Act?

Answer. The Department is in full compliance with the requirements of NEPA in all phases of the program. The Department has also developed a NEPA implementation plan for the deep geologic disposal interim strategy which is integrated with the overall decisionmaking process for the program, including each stage of the site selection process. A copy of this plan has been submitted separately for the hearing record.

Question 14. What are the Department's specific comments on:

(a) The schedule established in section 202 of H.R. 6390 and section 202 of H.R. 6390 and section 3 of H.R. 7418:

Answer. The Administration believes that the current nuclear waste R&D facilities at the Nevada Test Site and Hanford along with the proposed salt test facility, should be adequate to demonstrate the technologies involved in waste disposal. These projects are quite flexible and could address most of the technical questions that would be addressed by the R&D facilities envisioned in H.R. 6390 and 7418.

The Administration opposes any exemption for R&D facilities from NEPA (e.g., as in Section 202(a)(4)).

(b) Comments on the State Review Board established in section 203 of H.R. 6390:

Answer. DOE believes the mechanism defined in H.R. 6390, and the Udall amendment, may too restrictive on State governments. We believe that each State should have latitude in structuring its own organizations in line with its particular constitution and traditional division of responsibilities among State officials. This section should also recognize the role of the State Planning Council recently established by the President by Executive Order.

(c) Comments on the impact assistance provided under section 203(c) of H.R. 6390:

Answer. The language of the bill is excellent with respect to recognition of the desirability of assistance to any localities, which would be impacted significantly by a waste repository. However, it should be noted that the Administration has not yet specifically addressed this topic.

(d) Comments on the geographic distribution of site selection requirements of section 3(1) of H.R. 7418:

Answer. The Department believes that the delineation of regions deserves more thought regarding:

The geographic distribution of acceptable geologic environments;

Historical and political basis for regional compacts among States to jointly solve problems;

The total context of opportunities for State cooperation in solving a wide range of possibly similar problems;

Equitable distribution of the risks of transportation and repository systems; and,

Apportionment of waste flow among repositories as this affects system operational factors and costs of disposal

However, regional considerations are relevant only to the extent that qualified sites can be found in a given region.

(e) Comments on the canister specifications contained in section 3(2) of H.R. 7418:

Answer. The temperature to be used in an active repository or in a pilot (demonstration) repository should not be legislated but should be based on technical considerations. We believe it is too early to select the temperature.

Specifications for many requirements in addition to temperature must be developed and verified. These involve balancing temperature considerations with other impacts of a repository on the rock as well as the container and its waste; e.g., acidity, oxygen content and chemical nature of the rock. A low temperature; e.g., 90°–100° C is recognized to reduce the rate of chemical reactions and corrosion of the metal canister surrounding the waste. However, its importance must still be established at the conditions being considered for operation of repositories in each candidate rock type. Further, it is known that the selection of the materials used for canisters, overpacks, and other engineered barriers markedly changes the importance of temperature. Some materials are significantly affected as temperature is increased and others are not. The specification of temperature and other conditions should include the collective consideration of all design factors for a particular test or demonstration.

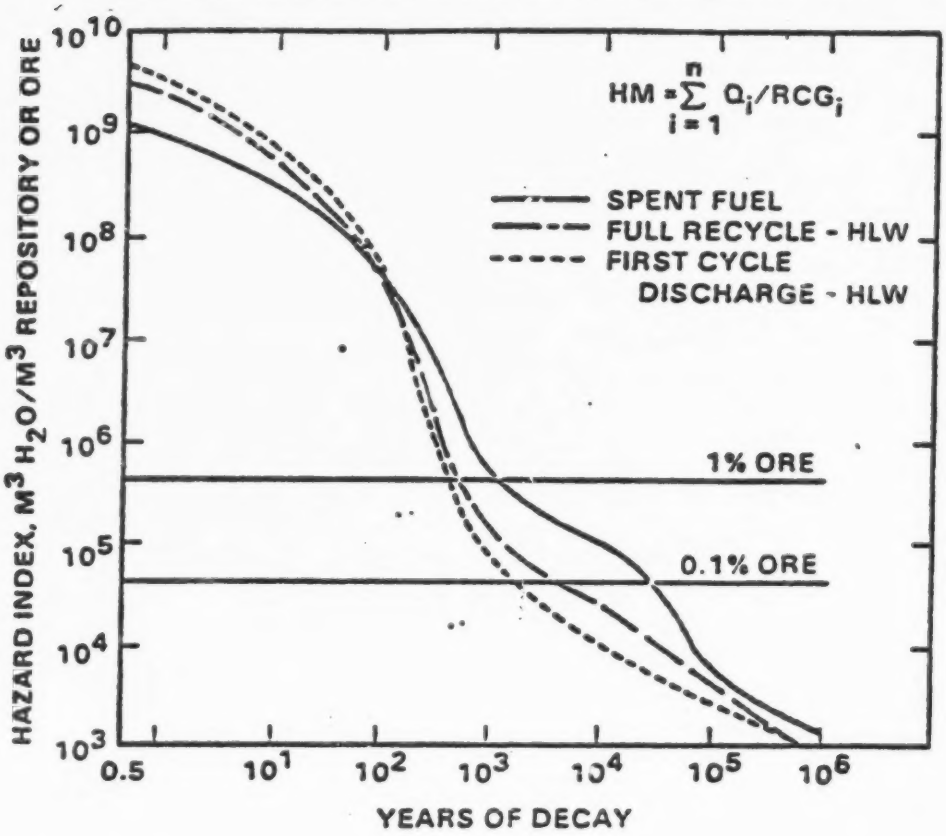
(f) Comments on the solidification requirement contained in section 3(3) of H.R. 7418:

Answer. Section 3(3) of H.R. 7418 would require that the waste package containment maintain its integrity until the health hazard of the waste is equivalent to natural uranium. The Department agrees that long periods of containment are needed but questions equating this time to an interpretation of uranium ore toxicity as this section would require. The following performance criterion has been proposed by the Department to NRC:

> Waste containment within the immediate vicinity of initial placement should be virtually complete during the period when radiation and thermal output are dominated by fission product decay. Any loss of containment should be a gradual process which results in very small fractional waste inventory release rates extending over very long release times; i.e., catastrophic losses of containment should not occur.

The interpretation of time varies depending on the fule cycle and type of uranium ore. The figure below illustrates the situation. For one percent ore, the decay years for various fuel cycles vary by a factor of 2–3. For one-tenth percent ore, the decay years are much greater and vary by a factor more than 10.

HAZARD INDEX COMPARISON OF SPENT FUEL, SHLW, AND URANIUM ORE



The NRC had proposed in their draft of repository regulations paragraph 60.111(c):

> Performance of Required Barriers and Engineered Systems requires that both the waste package and the underground facility be designed to provide reasonable assurance that radionuclides will be contained for at least 1,000 years after decommissioning.

The following table shows that most of the decrease in radioactivity, heat and hazard occurs in the first 300 to 500 years. It is recognized that other studies have produced varying results due to the input parameters assumed (burn up, etc.) However, we are not aware of any calculations that indicate that the hazard is dominated by fission products beyond 300 to 500 years.

FRACTION OF TOTAL CONTRIBUTED BY FISSION PRODUCTS IN SPENT FUEL

Decay time in years from discharge	Relative value of radioactivity [1]	Relative value of decay health [1]	Untreated dilution index (hazard)
100	0.5	0.286	1.0
300	0.18	0.02	8.3×10^{-3}
500	1.5×10^{-3}	9.0×10^{-4}	3.8×10^{-3}
1000	1.0×10^{-3}	3.5×10^{-4}	1.4×10^{-3}

[1] Fission product radioactivity (or heat) divided by total radioactivity (or heat).

Question 14(g). Comments on the restriction on the use of funds contained in section 5 of H.R. 7418.

Answer. We recommend that such a restriction not be included. It is often necessary to fund independent evaluations by groups not normally considered supportive of the program. This assures a concerned public that disinterested and independent evaluation of technical issues are being conducted. Agreement on controversial issues is often reached only by balancing points of view from both extremes. This is particularly important in working with State agencies and their scientific advisors who, in many cases, will have necessarily assumed positions somewhere between skepticism and opposition until all relevant questions of safety are answered.

ADDITIONAL VIEWS OF HON. TOBY MOFFETT

Nuclear waste presents a problem unique in our country's history. Never before have we been called upon to make decisions that must stand the test of thousands of years of time.

We all know how frequently we in the Congress and elsewhere in the government make decisions that appear right at one moment, but prove outmoded or misguided with the passage of time and unforeseen events. The mere suggestion that we can devise a plan which will accomplish its intended results for thousands of years causes many jaded citizens to smile.

Yet we have little choice. The wastes are there. They will remain toxic far beyond our lifetimes. A permanent means of insulating our citizens and generations of our descendants from that toxicity must be found.

Given the enormous span of time for which we are trying to plan in this legislative effort, I am deeply disturbed at the rapidity with which this legislation is being considered. It is apparent that a momentum has suddenly been built up that is pushing the Congress toward what I consider to be precipitous action.

With all appropriate deference to our Senate colleagues, that body's bill was passed in some haste, without floor consideration of a number of issues that have been widely discussed as important aspects of the problem. On this side, and again with all respect to our distinguished colleagues on the Science and Technology Committee, their rapid approval of their bill, H.R. 7418, placed legislative pressure on the Commerce Committee to pass some nuclear waste bill quickly. The sequential referral to our Committee had an inescapable deadline. We were obliged to pass out nuclear waste legislation that was as good as we could make it by that deadline, or lose the opportunity to participate fully in the House's deliberation on this critical issue.

Energy and Power Subcommittee Chairman John Dingell has done a superlative job of guiding the Subcommittee and assisting the full Committee toward bills that are indeed respectable efforts to solve this far-reach probiem of nuclear waste. The Commerce Committee versions of both H.R. 7418 and H.R. 6390 significant improvements over the bills approved respectively by the Science and Technology and the Interior Committees.

Despite that gargantuan effort, however, both these bills are flawed. They are regrettably not proposals which can comfortably be defended as ready to stand the test of the millenia.

Indeed, as Committee Members know, there was considerable controversy at the Committee level over such basic, fundamental concepts as the shape of the States' role in deciding just who will have these wastes in their own backyard. That controversy certainly will be carried to the floor of the House. Some Members are also concerned about the shape of other crucial aspects of the legislation, such as the adequacy of the environmental safeguards in the provisions dealing with the applicability of the National Environmental Policy Act (NEPA), particularly in H.R. 7418.

Numerous other critical issues will be debated on the floor, since it would be irresponsible of the Congress not to confront squarely and clearly the implications of many unresolved questions regardig safe storage of nuclear waste. Dry storage versus wet storage of

spent nuclear fuel; away-from-reactor storage of spent nuclear fuel versus the more cautious on-site storage option; how to estimate the cost of whatever storage system is selected and who will pay that cost—all of these issues and more must be resolved carefully, or else we are simply doing something today which we will have to undo later.

Indeed, the state of confusion in the Congress over the proper approach to this immensely complicated problem is exemplified by the fact that the full House has before it at least four separate versions of nuclear waste legislation. Each of those versions differs markedly from all of the others, and none matches very precisely with the Senate bill.

Yet there is considerable pressure on the House to express its will in this boggling area within a matter of days. Only a few hours of actual debate can be afforded within the constraints of the current legislative calendar. I submit to my colleagues that rapid action in such circumstances can only be condemned to error, and we cannot afford error in so important a matter.

Were I forced to choose, I would join with Chairman Dingell in preferring the Commerce version of H.R. 6390, with certain amendments that I intend to offer on the floor, over all other versions now before the Congress. But I would greatly prefer that neither I nor the other Members of this House be forced to choose so quickly among admittedly flawed bills. This is a deliberative body. Let us deliberate a little further before acting on an issue which we all know will remain with us far beyond the next few hectic weeks.

TOBY MOFFETT.

SEPARATE VIEWS OF REPRESENTATIVE EDWARD J. MARKEY

The Department of Energy and its predecessors have an unenviable track record in their dealings with the states over the question of where to locate nuclear waste repositories. A case in point is what happened to Kansas in the early 1970s. The story of how the Atomic Energy Commission tried to force the selection of a nuclear waste dump in Lyons, Kansas is told in a book by Ronnie Lipschutz, "Radioactive Waste: Politics, Technology and Risk" (Cambridge, Mass.: Ballinger, 1980). Excerpts from the Lipschutz book follow:

> By 1971, preparatory work was considered complete, and the AEC announced that permanent disposal of both transuranic and high level wastes would soon commence in the Lyons mine. The agency claimed that research had shown the method to be fully developed and the site to be suitable. The wastes would be isolated from the biosphere for the requisite period of time, according to the commission's claims.
>
> As of 1971, the AEC had spent fifteen years and some $100 million studying bedded salt disposal. The agency maintain that the radio-active waste problem was solved and that implementation of the solution could begin promptly. So confident was the AEC that Milton Shaw, director of the AEC's Division of Reactor Development in testifying before the Joint Committee on Atomic Energy on the fiscal year 1972 budget for the Lyons project . . . stated that the site was "equal or superior to the others (in the country)." But AEC confidence was, as things turned out, badly misplaced. The site was grossly unsuitable. The Kansas Geological Survey concluded that the Lyons site was not at all adequate for the purpose. Independent geologists concurred, for at the other end of the town of Lyons was another salt mine, and underneath the town, the galleries of the two mines came as close as 500 yards to the selected site. The operators of the second mine utilized a salt extraction process called hydraulic fracturing, in which fresh water is injected into one borehole and emerges from another as brine, which is then pumped to the surface. One of these operations unexpectedly produced no brine; over 180,000 gallons of water were pumped into a borehole and simply disappeared. It became clear that the geology of the site was inadequately known. Moreover . . . the location of many of these (oil and gas) boreholes was not known because the state of Kansas did not require the registration of dry wells. Dr. William Hambleton of the Kansas Geological Survey described the Lyons site as "a bit like a piece of Swiss cheese . . . ." The Kansas Geological Survey recommended abandonment of the site, and the citizens of Kansas showed strong resistance . . . . Under pressure from the Kansas congressional delegation, the AEC announced in 1973 that the Lyons site was being abandoned.

EDWARD J. MARKEY.

SEPARATE VIEWS TO THE COMMERCE COMMITTEE REPORT ON H.R. 7418, THE NUCLEAR WASTE RESEARCH, DEVELOPMENT AND DEMONSTRATION ACT OF 1980

The Committee on Interstate and Foreign Commerce has voted to report this measure as one approach to nuclear waste management policy. We wish to record our views on the bill and, to the extent it applies to the bill, our views on nuclear waste legislation in general.

We do not view H.R. 7418 as an acceptable vehicle for radioactive waste management legislation. The bill was originally reported by the Science and Technology Committee. As such, it spells out a program for waste disposal policy which is fundamentally flawed in almost every respect.

We would like to present our criticisms of the approach presented by this bill as reported by committee on Science and Technology, before noting our objections to the measure as approved by own Committee.

The Science Committee's bill establishes a research, development and demonstration program for mined geologic repositories for high-level radioactive waste. These demonstration facilities would have to be sited very quickly by the Department of Energy—the first two sites or to be selected by 1981, the second pair by the end of 1983—thus precluding careful examination of possible sites not already investigated. Furthermore, the National Environmental Policy Act, which has played such a critical safeguarding role in federal programs during the past decade, would not be applied to the site selection process for these demonstration facilities. State and local governments, Indian tribes and the general public are not afforded meaningful opportunities for participation in the program. In addition, these demonstration facilities would not be licensed by the Nuclear Regulatory Commission. Instead, they would be under the complete control of the Department of Energy.

Each of these four points is directly contrary to the recommendations of a number of reports on nuclear waste policy, of which the most important is the 1979 "Report to the President by the Interagency Review Group on Nuclear Waste Management." In this report, expanded multi-media site investigation, compliance with NEPA, state and local "consultation and concurrence," and NRC licensing of repositories are declared to be the cornerstones of the nation's geologic nuclear waste repository program.

The dangers of H.R. 7418, in the form reported from the Science Committee, include the following. First, the bill would allow emplacement of more than 40 metric tons of high-level radioactive waste in these so-called "demonstration" facilities. We are concerned that placing these wastes in hastily selected and constructed facilities could pose serious public health threats, jeopardizing local air and water supplies in the surrounding area. Second, it is likely that this program would lead, without adequate regulatory safeguards at the beginning, to the construction and operation of permanent, full-scale repositories at one or more of the sites of the demonstration facilities. This would be done by expanding the original facility. Discussions of environmental impacts and alternative sites or designs, as provided for under the National Environmental Policy Act, would be precluded. The Nuclear Regulatory

Commission—which has stated that its licensing of repositories must include NRC participation in the initial stages of DOE site preparation activities—woul. have no role until after the demonstration repository has already been in operation.

Our Committee was required to report our own version of this demonstration bill, under the limited time provided us under the sequential referral. Despite full calendars in the Energy and Power Subcommittee and the full Committee, an improved version of the Science Committee bill was agreed to, due to the able leadership of Mr. Dingell, chairman of the Subcommittee, and Mr. Staggers, chairman of the full Committee.

The improvements in the high-level waste section of H.R. 7418 made by our Committee are very significant. Among other advances, the Nuclear Regulatory Commission would have the "final say" over all safety questions. This considerable improvement is the result of an amendment offered by Mr. Ottinger. While we agreed that this is no substitute for full NRC licensing authority, this is a marked improvement over the Science Committee approach. Furthermore, the National Environmental Policy Act would be applied to the demonstration program, although not to the fullest extent possible. More significant opportunities are also provided for state and local participation in the repository program. However, these opportunities remain insufficient, particularly in light of the possibility that a demonstration repository could later be transformed into a full-scale, permanent facility.

As reported by the Commerce Committee, however, this bill does not contain adequate provisions guaranteeing that the states will fully participate with the federal government in selecting and safeguarding nuclear wast disposal sites. The only requirement of this bill is that the Secretary of Energy "consult and coordinate" with the officials of each state in which a demonstration repository is proposed. We believe that state governments must have much greater powers to object to such a proposal. Although the Commerce bill reduces the possibility that a demonstration repository will later become a full-scale, permanent repository, it remains a possibility in later years, should the judgment be subsequently reached that the demonstration facility should be converted to a permanent one. Therefore, we feel that state governments ought to have the legal right to object to the siting of a demonstration facility within their boundaries, subject to an override of that objection by Congress.

We object to the fundamental approach of any legislation which attempts to make research, development and demonstration in an unlicensed program the centerpiece of our national nuclear waste disposal policy. We strongly favor, instead, that we establish a reasonable timetable for the creation of a permanent repository which demonstrates that we can regulate, within our existing institutional framework, the facilities needed for the permanent disposal of high-level radioactive wastes. Moreover, we concur with the Committee's report that, contrary to the views expressed in Section 3(5) of H.R. 7418, demonstration facilities would be required to be licensed by the Nuclear Regulatory Commission under the provisions of Section 202 of the Energy Reorganization Act. H.R. 7418 fails, however, to specifically mandate this requirement.

Research and development is an essential element of the high-level waste repository program and all nuclear waste management programs. Much research is needed to examine geologic media heretofore ignored by the Department of Energy and its predecessors. Additional work is required to develop a better understanding of the physical and chemical reactions—both in the near-term and over geologic time—when various types of high-level nuclear wastes are "emplaced" in various types of geologic media. As Circular 779 of the U.S. Geological Survey, "Geological Disposal of High-Level Radioactive Wastes: Earth Science Perspective" (1978), makes plain, much work remains to be done.

Much of this work is now under way, both in the laboratory and in the field, carried out by the Department of Energy, the U.S. Geological Survey, and other agencies. (See "Earth Science Technical Plan for Mined Geologic Disposal of Radioactive Waste," Office of Nuclear Waste Management, U.S. Department of Energy, U.S. Geological Survey, and U.S. Department of Interior (January 1979), and "Nuclear Waste Management Program—Summary Document, fiscal year 1981, U.S. Department of Energy, March 1980.)

We are not in complete agreement with the Department of Energy's conduct of this research and development program. Moreover, this program has been under considerable attack in Congress this year in appropriations legislation. We are greatly concerned, in fact, that essential research—including the careful consideration of a number of potential repository sites in a variety of geologic media—may well be cancelled.

After years of lethargy and poorly directed research, the federal agencies are finally beginning the serious, comprehensive program of research and development necessary for a successful high-level waste isolation effort, under safeguards provided by the existing regulatory framework. According to the Federal Interagency Review Group and other reports, we can anticipate the operation of the first permanent, full-scale high-level geologic repository near the turn of the century or earlier. This timetable is based upon our ability to resolve scientific and technical problems within a short period of time. Of course, this projection also assumes that the program is allowed to continue in a step-by-step, comprehensive fashion.

Some of us have serious doubts whether we will ever be able to dispose of these lethal wastes in a manner which will adequately protect this generation and those to follow. However, we all recognize that we are faced with a limited number of unhappy alternative solutions to this problem. The most dangerous of these is to do nothing. We hope, therefore, that we will be able to establish a full-scale repository program as soon as possible, consistent with meeting the safety requirements imposed by our regulatory framework.

The approach to research and development presented by H.R. 7418 as reported by our Committee fails key tests which are paramount to ensuring a safe waste disposal program. It would force the Department of Energy, the U.S. Geological Survey, the Environmental Protection Agency, the Nuclear Regulatory Commission, and other federal and state agencies to cut off much of the essential work now under way. Instead, H.R. 7418 as reported by the science committee requires the Department of Energy to launch prematurely the process of selecting the sites for test facilities. Money

and personnel which would otherwise be available for research and development work already initiated would be transferred to the siting and construction of "demonstration" but unlicensed repositories.

In summary, it is necessary to distinguish between continued research and development, on the one hand, and premature "demonstration," which can retard necessary research, on the other hand. Hurried work at potential demonstration repositories is no substitute for the deliberate pace of a step-by-step and comprehensive waste management program. It is impossible to "demonstrate" the integrity of a particular geologic repository within the time frame suggested by H.R. 7418, i.e., less than twenty years. High-level wastes, including spent reactor fuel, remain extremely high in temperature and highly radioactive for thousands of years. Changes in the facility, the waste form, and the surrounding geologic environment could take place which would significantly affect the release of radioactivity into the surrounding water or air. Therefore, a repository's track record over 10 to 20 years "demonstrates," i.e. proves or guarantees, nothing with regard to the long-term integrity of the facility.

Scientific and engineering uncertainties remain unresolved with respect to the ultimate disposal of these waste materials. In Congress, we must work for legislation which establishes a political and regulatory framework for this highly contentious effort. We must ensure that the siting of full-scale geologic repositories will be based squarely upon the very cornerstones missing from H.R. 7418—full NRC licensing, full public and local and state government participation, full use of the National Environmental Policy Act, and full reliance on careful investigation of a wide number of potentially acceptable repository sites.

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SUPPLEMENTAL VIEWS ON H.R. 7418

We are gratified that the Committee has finally acted to establish a program for dealing with nuclear waste disposal. It is action which is long overdue.

Our nation's nuclear reactors have produced approximately 7,500 metric tons of spent nuclear fuel. This is roughly equivalent to 950 million barrels of oil in energy potential. Due to the current administration's misdirected policy of not permitting this spent fuel to be reprocessed, however, the potential energy in that spent fuel has gone unused. We are confident, however, that commercial reprocessing will soon be permitted again in this country. When it is, the spent fuel will be "recycled" and the usable energy resource removed. What will remain will be a small amount of liquid nuclear waste. Using proven technology, this liquid waste will be solidified in a glass-like form. It is then that we will need operating permanent repositories for this waste.

To achieve that goal, this Committee has passed two bills, H.R. 7418 and H.R. 6390, which together will provide the means by which operating repositories will be established. It is our hope that both bills will be integrated into a single bill to provide a comprehensive program for the development of these repositories. Such a bill would have an unlicensed research and development phase and a licensed permanent repository phase. This is as it should be. H.R. 7418, coming from the Committee on Science and Technology, is a research and development bill. It provides for unlicensed testing of different geologic media in which permanent repositories for nuclear waste might be located. It is a program of limited duration, expiring in the year 2000. H.R. 6390 provides for the establishment of permanent, licensed repositories for nuclear waste. This phase, coordinated with the unlicensed research, development and demonstration phase, can best bring about the establishment of permanent repositories which the Committee desires.

We note that the definition of high level waste in both H.R. 7418 and H.R. 6390, as reported by this Committee, includes spent fuel. Under such a definition spent fuel, a valuable energy resource, would not be reprocessed but would be forever lost by putting it in repositories for permanent storage. We believe that such blatant waste of a precious energy resource cannot be permitted. Both the Committee on Science and Technology and the Committee on Interior and Insular Affairs addressed this same issue and both rejected the notion of permanently storing spent fuel in repositories as established under H.R. 7418 or H.R. 6390. In the spirit of cooperation, and recognizing the need to move quickly to get these bills to the House Floor, we did not attempt in Full Committee to remove spent fuel from the definition of high level waste and, thus, prevent the spent fuel from being put in repositories. In the spirit of energy conservation, something which we know is important to all of our colleagues on both sides of the aisle, we will work to see that spent fuel is recycled by reprocessing. We trust that a reconciliation of differences between the three committees concerned will result in spent fuel being removed from the definition of high level waste and not permitted to be put into permanent repository storage. If not, then we will urge our colleagues to see that such action is taken when the bill or bills come to the House Floor.

We must assure that these repositories will truly be used for waste materials, and not for energy rich spent fuel.

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